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OFFICE OF WATER RESOURCES RESEARCH
WATER RESOURCES SCIENTIFIC INFORMATION CENTER

SELECTED WATER RESOURCES ABSTRACTS

VOLUME 6, NUMBER 16
AUGUST 15, 1973

W73-09751 -- 10400

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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VOLUME 6, NUMBER 16
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W73-09751 -- 10400

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
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07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
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09 MANPOWER, GRANTS, AND FACILITIES
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ABSTRACT SOURCES

02. WATER CYCLE

2A. General

THE HYDROLOGY OF FOUR SMALL SNOW ZONE WATERSHEDS,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
J. L. Smith.
Paper ASCE Annu Natl Environ Eng Meet, Houston, Tex, Oct 1972. 26 p, 2 fig, 6 tab, 2 ref.

Descriptors: *Watersheds (Basins), Hydrology, *Streamflow forecasting, *Runoff forecasting, Streamflow, Vegetation effects, Evapotranspiration, Precipitation (Atmospheric), Seepage, Water balance, Consumptive use, Water loss, Flow characteristics, Geology, Snowpacks, Snowmelt, Soil moisture, Snow surveys, Runoff, Water yield, Drainage, *California.
Identifiers: *Sierra Nevada, Sierra runoff.

Probably the largest single error in streamflow forecasting of small watersheds from snow survey data occurs from lack of soil water retention and detention data for different hydrographic units. Examples drawn from 10 yrs of streamflow, soil moisture, soils geology, and plant water use studies illustrate the effect of each upon the streamflow regimen of 4 small contiguous watersheds in the southern Sierra Nevada of California. The need for more data about the parameters influencing streamflow is also evidenced. Soils, along with the parent geology, exert one of the most important influences upon delivery of water to the stream. Details of soils and geology of the watersheds are described. Soil moisture measurement data, vegetation data, and streamflow characteristics of each watershed are also discussed. Analyses show that in extremely dry years in southern Sierra Nevada, nearly all incoming precipitation is used by vegetation; little or none is available for streamflow. Surplus moisture added to ground reserve may be detained on the watersheds for as long as 3 yrs before appearing in the stream. (USBR)
W73-09765

HYDROLOGIC IMPLICATIONS OF THE SAN ANGELO CUMULUS PROJECT,
Texas A and M Univ., College Station. Dept. of Meteorology.
R. A. Clark, and F. J. Carvell.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 39-49, 1972. 5 fig, 2 tab, 2 ref.

Descriptors: *Hydrology, *Reservoirs, *Dry seasons, *Texas, *Cloud seeding, Weather modification, Precipitation (Atmospheric), Streamflow, Runoff, Climatology, Storms, Hydrologic data, Flow augmentation.
Identifiers: *Concho River basin (Tex), San Angelo Reservoir (Tex), Twin Buttes Reservoir (Tex).

Data are presented concerning the hydrology of San Angelo Reservoir and Twin Buttes Reservoir on branches of the Concho River immediately above San Agnelo, Texas. In order to produce appreciable runoff in the Concho River basin: (a) storms must be of a relatively large magnitude, probably greater than 2 inches, (b) they must cover areas in excess of 100 square miles, and (c) the antecedent moisture conditions must be favorable. Conclusions with reference to rainfall augmentation in the Concho River basin are: (a) modification of small cloud elements will affect hydrologic conditions only indirectly through the effects of light rains on soil moisture, (b) hydrologic evaluation is, at best, very tentative because of the very low runoff response to significant storm input, and (c) a properly posed project with augmentation of runoff as a primary goal must consider basic hydrologic elements such as soil type, basin configuration and slopes, channel characteristics, antecedent moisture, season, vegetation cover, and the significance of varying rainfall intensities. (See also W73-09773) (Woodard-USGS)
W73-09777

MODELLING PROCESSES FOR STUDY AND EXPLORATION OF LAKE ECOLOGICAL SYSTEM (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.
For primary bibliographic entry see Field 02H.
W73-09821

WATER RESOURCES DEVELOPMENT IN THE MULLICA RIVER BASIN PART II: CONJUNCTIVE USE OF SURFACE AND GROUNDWATERS OF THE MULLICA RIVER BASIN,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 04B.
W73-09870

THE RELATIONSHIP BETWEEN RAINFALL, GEOMORPHIC DEVELOPMENT AND THE OCCURRENCE OF GROUNDWATER IN PRECAMBRIAN ROCKS OF WESTERN AUSTRALIA,
For primary bibliographic entry see Field 02F.
W73-09958

MATERIALS OF THE ANNIVERSARY SESSION OF THE ACADEMIC COUNCIL (MATERIALY YUBILEYNOY SESSII UCHENOGO SOVETA).
Kazakhskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Alma-Ata (USSR).

Kazakhskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 51, Kh. A. Akhmedzhanov, and A. P. Agarkova, editors, Leningrad, 1971. 200 p.

Descriptors: *Investigations, *Climatology, *Meteorology, Weather, Atmosphere, Air temperature, Snowpacks, Precipitation (Atmospheric), Evaporation, Runoff, Water balance, Water resources, Orography, Mountains, Mudflows, Model studies, Forecasting, Curves, Equations, Maps.
Identifiers: *USSR, *Kazakhstan.

Development of scientific investigations at the Kazakh Hydrometeorological Scientific Research Institute (KazNIGMI) is discussed in this commemorative issue marking the 20th anniversary of the Institute's founding. Topics in this collection of 18 papers include: (1) results of 20 years of research by KazNIGMI; (2) 20 years of research on the problem of long-range weather forecasting; (3) models of mudflow processes; (4) glacial mudflows and forecasting techniques; (5) mudflow classification and distribution on the northern slope of Zailiski Alatau; (6) observations and computation of mudflows in the Kokcheka River basin; (7) spatial distribution of atmospheric precipitation, streamflow, and maximum water equivalent of snowpacks in Kazakhstan; (8) calculation of water-balance components for mountain basins on the northern slope of Zailiski Alatau; (9) complex use of water resources in the Aral Sea basin; (10) synoptic and meteorologic conditions in development of wheat rust in northern Kazakhstan; (11) advance forecasting of amount and duration of storm precipitation for the northern slope of Zailiski Alatau; (12) comparison of methods for the determination of average long-term annual evaporation in southeastern Kazakhstan. (Josefson-USGS)
W73-10048

WATER BALANCE IN THE GEORGIAN SSR (VODNYY BALANS GRUZII),
Akademiya Nauk Gruzinskoi SSR, Tiflis. Institut Geografii.
L. A. Vladimirov.
Meteorologiya i Gidrologiya, No 6, p 86-88, June 1972. 1 tab, 6 ref.

Descriptors: *Water balance, *Orography, Mountains, Elevation, Precipitation (Atmospheric), Runoff, Surface runoff, Subsurface runoff, Subsurface flow, Runoff coefficient, Evaporation.
Identifiers: *USSR, *Georgian SSR.

Annual precipitation for the Georgian SSR is 96.9 cu km, of which 65.3 cu km occurs in western Georgia and 31.6 cu km in eastern Georgia. Annual runoff of streams is 56.9 cu km, including 42.5 cu km from the western part and 14.4 cu km from the eastern part. Total streamflow, including flow derived from outside the Republic, is 65.3 cu km. The runoff coefficient is highest (0.85) in the high-mountain zone of the Western Caucasus and lowest (0.20) in the lowlands of the Khrami River basin. Methods are given for studying items in the water balance in the high-mountain zone and for determining subsurface flow into streams. (Josefson-USGS)
W73-10050

WATER-TABLE FLUCTUATION IN SEMIPERVIOUS STREAM-UNCONFINED AQUIFER SYSTEMS,
California Univ., Davis.
For primary bibliographic entry see Field 02F.
W73-10058

A REVIEW OF SOME MATHEMATICAL MODELS USED IN HYDROLOGY, WITH OBSERVATIONS ON THEIR CALIBRATION AND USE,
Institute of Hydrology, Wallingford (England).
R. T. Clarke.
Journal of Hydrology, Vol 19, No 1, p 1-20, May 1973. 91 ref.

Descriptors: *Statistical models, *Mathematical models, *Model studies, Variability, Probability, Least squares method, Regression analysis, Correlation analysis, Stochastic processes, Systems analysis.

Terms that are frequently used (and misused) where mathematical models are applied to solve hydrological problems are reviewed, and some of the many available models are classified into four main groups. It is suggested that models with parameters estimated by a least-squares objective function represent an application of nonlinear regression theory to situations in which the assumptions in this theory are seldom valid. The correction required is not the use of objective functions, but the use of more realistic assumptions concerning the stochastic structure of the model residuals. Interdependence between model parameters necessitates extensive exploration of the sum-of-squares surface in the neighborhood of its minimum even when regression assumptions are valid; this is particularly true where the model is to be used to examine the likely effects of a proposed physical change to the catchment, since the complexity of such a change will not generally be represented by a change in one (or even some) of the model's parameters, regardless of the remainder. (Knapp-USGS)
W73-10061

METHOD OF EVALUATING WATER BALANCE IN SITU ON THE BASIS OF WATER CONTENT MEASUREMENTS AND SUCTION EFFECTS (METHODE D'EVALUATION DU BILAN HYDRIQUE IN SITU A PARTIR DE LA MESURE DES TENEURS EN EAU ET DES SUCCIONS),
Grenoble Univ. (France).

J-F. Daian, and G. Vachaud.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 649-660. 5 fig, 1 tab, 8 ref.

Descriptors: *Unsaturated flow, *Hydraulic conductivity, *Water balance, *Groundwater recharge, Moisture meters, Radioactivity techniques, Tensiometers, Soil water movement, Darcys law, Capillary conductivity, Hydraulic gradient, Precipitation (Atmospheric), Recharge, Evaporation.

Knowledge of the entire hydrologic region as well as strictly local factors are required to predict the water balance (including aquifer recharge). In 1970, measurements (including daily determination with a neutron moisture meter of soil moisture at 10-120 cm depth) indicated that 66% to 91% of rainfall reached 120 cm depth at a site near the Isere River. Uncertainties in interpretation included estimation of seepage from the river, spatial inhomogeneity in local rainfall, neglect of lateral flow, and assumption that air in soil voids was at atmospheric pressure. (See also W72-12358 and W72-10679) (Bopp-ORNL)
W73-10197

2B. Precipitation

PROCEEDINGS--SOUTHERN PLAINS REGION CLOUDTAP CONFERENCE.
For primary bibliographic entry see Field 03B.
W73-09773

RESULTS FROM AN APPLICATIONS PROGRAM OF HAIL SUPPRESSION IN TEXAS,
Atmospherics, Inc., Fresno, Calif.
For primary bibliographic entry see Field 03B.
W73-09779

FIFTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE, WEATHER MODIFICATION PROGRAM (FY 1972),
Air Weather Service, Scott AFB, Ill.
For primary bibliographic entry see Field 03B.
W73-09785

THE MOKOBULAAN RESEARCH CATCHMENTS,
For primary bibliographic entry see Field 03B.
W73-09910

SAMPLING, HANDLING AND COMPUTER PROCESSING OF MICROMETEOROLOGICAL DATA FOR THE STUDY OF CROP ECOSYSTEMS,
For primary bibliographic entry see Field 07C.
W73-10001

ICE NUCLEATION: ELEMENTAL IDENTIFICATION OF PARTICLES IN SNOW CRYSTALS,
National Oceanic and Atmospheric Administration, Boulder, Colo. Atmospheric Physics and Chemistry Lab.
For primary bibliographic entry see Field 03B.
W73-10037

THEORETICAL APPROXIMATION TOWARD TWO FUNDAMENTAL MODELS OF CLIMATE ON EARTH,
S. De J. Soria.
Acta Agron (Palmira). Vol 21, No 4, p 165-177. 1971. Illus.
Identifiers: Biomes, *Climates, Earth, *Model studies, Theoretical studies.

Climatic conditions prevailing under an equinoxial and a solstitial model of the earth are compared, using an extraterrestrial energy curve in which the ordinate represents Langleys per day and the abscissa the months of the year. The equinoxial curve is taken at latitude 0 deg (the equator) and solstital curves are shown at latitudes ranging from latitudes 23 deg, 30, 45 and 90. The astronomic fundamentals are defined and many authors are quoted as to the effect of the various conditions on atmospheric circulation, rain, evaporation and evapotranspiration, as well as the resulting biomes, which are the major biological systems morphologically characterized by the equinoxial belt.--Copyright 1973, Biological Abstracts, Inc.
W73-10154

AIR FLOW LAND-SEA-AIR-INTERFACE: MONTEREY BAY, CALIFORNIA - 1971,
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 05B.
W73-10223

A REVIEW OF METHODS FOR PREDICTING AIR POLLUTION DISPERSION,
National Aeronautics and Space Administration, Hampton, Va. Langley Research Center. National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 05A.
W73-10324

2C. Snow, Ice, and Frost

FIFTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE, WEATHER MODIFICATION PROGRAM (FY 1972),
Air Weather Service, Scott AFB, Ill.
For primary bibliographic entry see Field 03B.
W73-09785

EVALUATION OF NORTH WATER SPRING ICE COVER FROM SATELLITE PHOTOGRAPHS,
McGill Univ., Montreal (Quebec). Dept. of Meteorology.
P. G. Aber, and E. Vowinckel.
Available from NTIS, Springfield, Va 22151 N72-29300 Price $3.25 printed copy; $0.95 microfiche. Publication in Meteorology No 101, June 1971. 19 p, 4 fig, 1 tab, 4 ref. Defense Res Bd. of Canada Grant 9511-107.

Descriptors: *Ice cover, *Mapping, *Aerial photography, *Arctic, Satellites (Artificial), Methodology, Reviews, Evaluation, Data collections, Climatology, Ice, Melting, Freezing, Distribution patterns, Remote sensing.
Identifiers: *Baffin Bay, North water.

Satellite photographs for two years (March-September) have been used to study ice cover in the polynya called 'North Water' and to determine whether reliable ice maps can be made from satellite data without computer analysis. After early July the clouds become opaque and distinction between cloud and ice is impossible. Ice distribution for short periods can best be obtained by careful human photo interpretation. The most persistant open water is at the northern edge, at about 78 deg N. The southern ice edge is diffuse. The changes in ice cover in the North are mainly caused by freezing and melting, while ice transport is important in the southern area. (Woodard-USGS)
W73-09800

MANIFESTATION OF EROSION IN PERMAFROST ON THE YAMAL PENINSULA (PROYAVLENIYE EROZII V MNOGOLETNEMERZLYKH PORODAKH NA YAMALE),
For primary bibliographic entry see Field 02J.
W73-09805

MICROWAVE RADIOMETRIC INVESTIGATIONS OF SNOWPACKS--FINAL REPORT,
Aerojet-General Corp., El Monte, Calif. Microwave Div.
A. T. Edgerton, A. Stogryn, and G. Poe.
Available from NTIS, Springfield, Va. 22151 as PB-205 009, Price $3.00 printed copy; $0.95 microfiche. Geological Survey Interagency Report USGS-230, July 1971. 82 p, 28 fig, 17 ref, append.

Descriptors: *Snowpacks, *Snow surveys, *Snowmelt, *Water equivalent, *Microwaves, Radio waves, Density stratification, Refractivity, Temperature, On-site investigations, Hydrologic data, Laboratory tests, Theoretical analysis, Model studies, Numerical analysis.

Two years of basic and applied research are summarized concerning microwave radiometric emissions of snowpacks. The research consisted of an integrated program of field, laboratory, and theoretical investigations. Research activities encompass numerous multifrequency microwave radiometric measurements of a relatively large variety of snowpacks, numerical modeling of snowpack emission, dielectric constant measurements and techniques and laboratory bi-static reflectivity measurements of snow samples. Experiments demonstrated that direct empirical relationships exist between snowpack water equivalent and its microwave emission. Theoretical studies which accounted for subsurface snow structure provided qualitative reasons for explaining measured results but did not generally agree with measured data. The lack of agreement is believed due to the inadequacy of presently available snowpack models to account for nonspecular surface scattering associated with small-scale surface irregularities and volume scattering with random inhomogeneities. (Woodard-USGS)
W73-09995

SEA ICE OBSERVATION BY MEANS OF SATELLITE,
Alaska Univ., College. Geophysical Inst.
For primary bibliographic entry see Field 07B.
W73-10044

FORMATION OF HEAT CRACKS IN ICE COVER OF RIVERS AND BODIES OF WATER (USLOVIYA OBRAZOVANIYA TERMICHESKHIKH TRESHCHIN V LEDYANOM POKROVE REK I VODOYEMOV),
Gorkovskii Inzhenerno-Stroitelnyi Institut (USSR).
D. F. Panfilov.
Meteorologiya i Gidrologiya, No 9, p 72-76, September 1972. 3 ref.

Descriptors: *Ice cover, *Rivers, *Bodies of water, *Cracks, *Thermal stress, Temperature, Cooling, Heating, Ice loads, Deformation, Youngs modulus, Equations.
Identifiers: *USSR, Ice properties.

A study was made of conditions under which cracks are first formed in ice cover of rivers and bodies of water. An analysis of the effects of both vigorous and comparatively slow temperature changes at the surface of ice cover is based on data on the deformation properties of ice. (Josefson-USGS)
W73-10049

GLACIERS AS INDICATORS OF WATER CONTENT (LEDNIKI KAK INDIKATORY VODNOSTI),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
V. G. Khodakov, and G. P. Moiseyeva.
Meteorologiya i Gidrologiya, No 6, p 83-86, June 1972. 1 fig, 18 ref.

Descriptors: *Glaciers, *Water equivalent, Snowpacks, Ice, Ablation, Air temperature, Solar radiation, Altitude, Measurement, Equations.
Identifiers: *USSR, Firn line.

The sources of information used for making estimates of water content in glacierized areas of the USSR include: (1) annual ablation of snow and ice, obtained from measurements on glaciers throughout the world; (2) climatic data on air temperature and solar radiation for the USSR; and (3) data on location and morphology of glaciers, obtained from the USSR Glacier Catalog published by the State Hydrometeorological Publishing Agency. The indicator role of glaciers can be used to obtain additional information on the spatial distribution of water content whenever there is little or no direct hydrometeorological data on precipitation and runoff. (Josefson-USGS)
W73-10051

STATISTICAL CHARACTERISTICS OF VELOCITY AND TEMPERATURE FIELDS IN ICE-COVERED BODIES OF WATER (STATISTICHESKIYE KHARAKTERISTIKI POLEY SKOROSTI I TEMPERATURY V VODOYEMAKH, POKRYTYKH L'DOM),
Moscow State Univ. (USSR).
Ye. P. Anisimova, and A. A. Speranskayava.
Meteorologiya i Gidrologiya, No 6, p 68-73, June 1972. 4 fig, 8 ref.

Descriptors: *Ice cover, *Bodies of water, *Velocity, *Temperature, Water temperature, Thermocline, Flow, Turbulence, Mixing, Instrumentation, Measurement, Equations.
Identifiers: *USSR, Heat exchange, Heat flux.

Results are presented of measurements of mean water temperature and flow velocity in fresh bodies of water covered by ice. The turbulent structure of flows in slowly flowing ice-covered bodies of water is similar to the structure of two-dimensional confined flows and can be used in computations of velocity and temperature fields in natural freshwater reservoirs in winter. (Josefson-USGS)
W73-10052

PROBLEMS IN HYDROLOGY OF ESTUARINE REACHES OF SIBERIAN RIVERS (PROBLEMY GIDROLOGII UST'YEVYKH OBLASTEY SIBIRSKIKH REK).
Arkticheskii i Antarkticheskii Nauchno-Issledovatelskiy Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02L.
W73-10053

SPECIAL PROBLEMS OF THE ARCTIC ENVIRONMENT,
Arctic Inst. of North America, Washington, D.C.
For primary bibliographic entry see Field 05C.
W73-10134

DESCRIBING ARIZONA SNOWPACKS IN FORESTED CONDITION WITH STORAGE-DURATION INDEX,
Arizona Univ., Tucson. Dept. of Watershed Management.
P. F. Ffolliott, and D. B. Thorud.
Progressive Agriculture in Arizona, Vol 25, No 1, p 6-7, January-February 1973. 2 tab, 7 ref. OWRR A-014-ARIZ (9) 14-31-0001-3203.

Descriptors: *Snow management, *Snowmelt, *Ponderosa pine trees, *Water storage, *Vegetation effects, Environmental effects, *Arizona, Snowpacks, Elevation, Water equivalent, Water yield, Watershed management, Regression analysis, Slopes, Forecasting, Streamflow forecasting.
Identifiers: *Storage-duration index, Inventory-prediction, Beaver Creek (Ariz.), Aspect, Forest density.

Exploratory work was designed to evaluate the storage-duration index as related to inventory-prediction variables of forest density, potential insolation (slope steepness and aspect), and elevation. The study utilized 75 sample plots in the ponderosa pine type on the Beaver Creek Watershed in Arizona for 1967-68 and 1968-69. The storage-duration index provides an integrated single estimate of initial snow storage and subsequent melt rates, and was developed for each time period by adding together snowpack water equivalent measurements made in successive surveys for the period. A multiple regression analysis showed similar relationships between storage-duration index values and inventory-prediction variables for both years of study; such a relationship is useful for identifying sites with desired snowpack storage conditions. On the Beaver Creek Study Area large initial storage followed by slow melting was associated with low forest densities, low potential insolation values, and high elevations, as sites exhibiting all three characteristics possessed maximum index values. Low initial storage followed by rapid melting was associated with the opposite site characteristics. (White-Arizona)
W73-10152

WATER UPTAKE OF PINES FROM FROZEN SOIL,
Finnish Forest Research Inst., Helsinki (Finland).
For primary bibliographic entry see Field 02D.
W73-10189

EFFECTS OF OIL UNDER SEA ICE,
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
For primary bibliographic entry see Field 05B.
W73-10246

2D. Evaporation and Transpiration

EVAPOTRANSPIRATION OF DIFFERENT CROPS IN A MEDITERRANEAN SEMI-ARID REGION, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre d'Adiopodoume.
B. A. Monteny.
Agric Meteorol. Vol 10, No 1/2, p 19-38, 1972. Illus. English summary.
Identifiers: *Advection, *Arid lands, Crops, Density, Energy balance, *Evapotranspiration, Humidity, Index, Irrigation, Leaf, Mediterranean areas, Stomata, Temperature, Transpiration, Winds.

The value of the maximum evapotranspiration in an arid region depends on the kind of crop chosen. The energy balance method has shown the importance of a source of energy in this semi-arid region (Tunisia)-advection. Under conditions of large scale advection (oasis effect), the ratio between maximum evapotranspiration and net radiation exceeds generally unity. The water loss from the different crops receiving optimum irrigation treatment varies widely. The factors which could influence the maximum crop evapotranspiration include: the air characteristics (temperature, humidity, wind-speed) flowing from a dry area into the experimental irrigated area; the solar energy interception and the crop architecture; the extent of the transpirating surface (leaf development, leaf area index) and its characteristics (geometry, stomatal density, tropism). For a large area cultivated with a defined crop the measured evapotranspiration from this crop would be a more accurate method of irrigation control. It is difficult in those arid conditions to evaluate the water requirements for a cropped surface by climatological formulae because of the importance of the physiological factors.--Copyright 1972, Biological Abstracts, Inc.
W73-09836

GROWTH AND WATER USE OF LOLIUM PERENNE: I. WATER TRANSPORT,
Rothamsted Experimental Station, Harpenden (England).
For primary bibliographic entry see Field 02I.
W73-09973

THE EFFECT OF TOTAL WATER SUPPLY AND OF FREQUENCY OF APPLICATION UPON LUCERNE: I. DRY MATTER PRODUCTION,
Reading Univ. (England). Dept. of Agricultural Botany.
For primary bibliographic entry see Field 03F.
W73-09975

THE EFFECT OF DIFFERENT LEVELS OF WATER SUPPLY ON TRANSPIRATION COEFFICIENT AND PHOTOSYNTHETIC PIGMENTS OF COTTON PLANT,
National Research Centre, Cairo (Egypt). Plant Physiology Dept.
For primary bibliographic entry see Field 03F.
W73-09979

PRELIMINARY RESULTS ON THE EFFECT OF POLYETHYLENE FOIL APPLIED AS A BARRIER LAYER, (IN GERMAN),
Rostock Univ. (East Germany). Institut fuer Meliorationswesen.
H. Koenker.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 4/5, p 407-413. 1972. Illus. English summary.
Identifiers: *Barrier layers, Crops, *Evapotranspiration, Polyethylene foils, Retention, Transpiration, Water retention.

The increase of the precipitation retention of a sandy soil by means of a polyethylene foil barrier applied at a depth of 1 m was studied in a field experiment. The water that was retained above the barrier led to a rise of soil moisture up to closely below the topsoil. In dry periods, water evapotranspiration on the barrier variants was about 4 times as high as that on the control plot. Deep-rooted crop plants made good use of the water that was retained above the barrier, while it was less available for plants with a shallow root system.--Copyright 1973, Biological Abstracts, Inc.
W73-09983

ON THE HYDROPHOBIZATION OF A SOIL LAYER WITH THE VIEW OF INTERRUPTING CAPILLARY WATER MOVEMENT, (IN GERMAN),
Dsutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Muencheberg (East Germany). Forschungszentrum Bodenfruchtbarkeit.
H. Hergehan.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 4/5, p 399-405. 1972. Illus. English summary.
Identifiers: *Evaporation, *Hydrophobization, Soil layers, *Water movement (Capillary).

The wettability of soil samples may be reduced by means of substances that lower the interfacial tension (structural hydrophobization) and by partial sealing of the aggregate pores by means of emulsions with a naturally hydrophobic disperse phase (indirect hydrophobization). The extent of hydrophobization depends on the applied amount of the substance and largely on the length of the hydrophobic hydrocarbon and on the charge of the active group. Hydrophobization of a soil layer leads to an interruption of the capillary water movement and thus, in the laboratory experiments, to a reduction of unproductive evaporation from the soil samples.--Copyright 1973, Biological Abstracts, Inc.
W73-09984

MODES OF ACTION AND METHODS OF APPLICATION OF SOIL CONDITIONERS FOR IMPROVING PHYSICAL PROPERTIES OF THE SOIL, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenchaften zu Berlin, Muenchberg (East Germany). Forschungszentrum Bodenfruchtbarkeit.
For primary bibliographic entry see Field 02G.
W73-09985

PATTERNS OF GROUNDWATER DISCHARGE BY EVAPORATION AND QUANTITATIVE ESTIMATES OF THE FACTORS AFFECTING EVAPORATION AND CONVECTIVE HEAT EXCHANGE (ZAKONOMERNOSTI RASKHODA GRUNTOVYKH VOD NA ISPARENIYE I KOLICHESTVENNYY UCHET F AKTOROV, VLIYAYUSHCHIKH NA ISPARENIYE I KONVEKTIVNYY TEPLOOBMEN),
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
A. M. Mkhitaryan, A. S. Akopyan, and M. G. Dagestanyan.
Zakavkazskiy Nauchno-Issledovatel'skiy Gidrometeorologicheskiy Institut Trudy, No 51 (57), Leningrad, 1972. 180 p.

Descriptors: *Estimating, *Groundwater, *Evaporation, *Convection, *Heat transfer, Heat balance, Temperature, Radiation, Air circulation, Atmosphere, Turbulence, Mixing, Water balance, Water table, Zone of aeration, Drainage, Irrigation, Lysimeters, Geomorphology, Measurement.
Identifiers: *USSR, *Armenia, *Ararat Plain, *Heat exchange, Moisture exchange.

Moisture exchange in the zone of aeration and evaporation from the groundwater surface at different water-table depths were investigated on the Ararat Plain in Armenia. Physiographic conditions and heat and water regimes of the plain are examined together with techniques of evaporation measurement. Quantitative estimates are made of the influence of different factors on the processes of evaporation and convective exchange of heat with the atmosphere. (Josefson-USGS)
W73-10056

ON THE ESTIMATION OF EVAPORATION AND CLIMATIC WATER BALANCE FOR PRACTICAL FARMING, (IN GERMAN),
For primary bibliographic entry see Field 03F.
W73-10072

TRANSPIRATION OF REED (PHRAGMITES COMMUNIS TRIN.),
Polish Academy of Sciences, Warsaw. Dept. of Applied Limnology.
J. Krolikowska.
Pol Arch Hydrobiol. Vol 18 No 4, p 347-358. 1971. Illus.
Identifiers: Aquatic plants, Humidity, Infection, Leaves, Panicle, Phragmites-Communis, Radiation, *Reed, Seasonal, Temperature, *Transpiration, Ustilago-Grandis, *Poland, *Mikolajskie Lake.

Transpiration of P. communis in a reed-belt of Mikolajskie Lake was measured at 2 sites: one terrestrial and one aquatic during the vegetation season of 1969. The intensity of reed transpiration increases with the increase of its fresh weight; it also increases with the rise of air temperature and of solar radiation values, but decreases with the rise of relative humidity; transpiration rate rises rapidly in the morning and gradually decreases in the afternoon--maximal values were found between 11 a.m. and 1 p.m. The transpiration intensity increases from spring till mid-summer, then decreases; the maximum was found in late end of July and early August. The reed growing on land transpires less than the one in the lake, and is also shorter. The leaves of the upper part of shoot (younger ones) transpire more than the lower (older) ones. The formation of panicle slows down the transpiration of reed leaves. The infection by Ustilago grandis Fr. lowers the intensity of reed transpiration. Transpiration of reed is of an intensity which can influence the water balance of the lake.--Copyright 1973, Biological Abstracts, Inc.
W73-10160

WATER UPTAKE OF PINES FROM FROZEN SOIL,
Finnish Forest Research Inst., Helsinki (Finland).
M. Leikola, and E. Paavilainen.

Descriptors: *Tracers, *Coniferous forests, *Transpiration, *Cold regions, Scotch pine trees, Soil-water-plant relationships, Available water, Moisture stress, Moisture uptake, Moisture availability, Plant physiology, Freezing, Neutron activation analysis, Radioactivity techniques, Radioecology.
Identifiers: Scandium radioisotopes.

Although a control peatland plot thawed in May, a second plot was caused to remain partially frozen until July by shoveling off the snow in winter and by insulating with straw in spring. Transpiration of young trees was measured by analysis of the needles for a tracer that had been injected into the trunk. The presence of tracer in the needles of trees on the colder plot showed that transpiration occurred at 0 dec C; however, about 5.5 times more tracer was present in needles of trees on the warmer plot for a May 8 injection (measured 2-3 days after injection), and about 3.4 times more for a May 28 injection. (Bopp-ORNL)
W73-10189

USE OF TRITIATED WATER FOR DETERMINATION OF PLANT TRANSPIRATION AND BIOMASS UNDER FIELD CONDITIONS,
Argonne National Lab., Ill.
J. R. Kline, M. L. Stewart, C. F. Jordan, and P. Kovac.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec. 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 419-437, 3 fig, 8 tab, 13 ref.

Descriptors: *Water requirements, *Trees, *Grasslands, *Tritium, Tracers, Water stress, Transpiration, Soil-water-plant relationships, Jack Pine Trees, Corn (Field), Oats, Coniferous trees, Coniferous forests, Analytical techniques, Radioecology.

The tracer method was corroborated by other methods. Transpiration ranged from 6 ml/hr (small saplings) to 900 ml/hr (large conifers). Biomass ranged from 167 g to 400 kg. The feasibility of using tracer to measure the mean water turnover in grasslands was tested by labeling by the vapor exchange method. This method appears to be inherently more precise than tritium injection that must be used for trees and large plants. The method has been applied to field studies of grasslands as will be described in a future report. The high water turnover rate in grasslands makes measurements feasible in a few hours as compared with days and weeks for trees. (See also W72-10679) (Bopp-ORNL)
W73-10190

ESTIMATE OF WATER BALANCE IN AN EVERGREEN FOREST IN THE LOWER IVORY COAST (ESTIMATION DU BILAN HYDRIQUE DANS UNE FORET SEMPERVIRENTE DE BASSE COTE-D'IVOIRE),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre d'Adiopodoume.
C. Huttel.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 439-452. 6 fig, 20 ref.

Descriptors: *Transpiration, *Forest soils, *Radioactivity techniques, *Soil moisture meters, Coniferous forest, Water balance, Africa, Biomass, Water requirements.

Transpiration for an evergreen forest was calculated from a water balance using in-situ soil moisture measurements with a neutron moisture meter. For a plateau site the precipitation in 1970 was 1449 mm (750 mm less than the mean for several years), the quantity of water reaching a depth of 2.3 meters in the soil was 374 mm, and the transpiration was 1075 mm. Transpiration correlated with the increase in biomass for the plateau station, but lack of correlation in a nearby valley suggested that growth was limited by other factors there. (See also W72-10679) (Bopp-ORNL)
W73-10198

2E. Streamflow and Runoff

LOW-FLOW CHARACTERISTICS OF STREAMS IN THE PACIFIC SLOPE BASINS AND LOWER COLUMBIA RIVER BASIN, WASHINGTON,
Geological Survey, Tacoma, Wash.
E. G. Nassar.
Open-file report, 1973. 68 p, 16 fig, 9 tab, 16 ref.

Descriptors: *Streamflow, *Low flow, *Low-flow frequency, *Gaging stations, *Washington, Hydrologic data, Basic data collections, Runoff, Discharge measurement, Flow rates, Curves, Maps, Base flow, Slopes, Topography.
Identifiers: *Pacific Slope basins (Wash), *Columbia River basin (Wash).

Low-flow characteristics of selected streams in the state of Washington are defined by four indexes derived from gaging station records for 67 streams whose flows are largely free of regulation or major diversions. The indexes are (1) the low-flow yield index, or the ordinate of the annual 7-day minimum low-flow frequency curve at 2-year recurrence interval, expressed in unit runoff per square mile; (2) the slope index, or the ratio of the ordinate of the 7-day minimum low-flow frequency curve at 2-year recurrence interval to that at 20-year recurrence interval; (3) the spacing index, or the ratio of the ordinates of the 183-day to the 7-day frequency curves at 2-year recurrence interval; and (4) the base-flow index, or the ratio of the yield index to the mean annual discharge per square mile of drainage area. Yield indexes ranged from 0.06 to 6.07 cfs per square mile; slope indexes ranged from 1.15 to 6.23; spacing indexes from 1.25 to 8.62; and base-flow indexes from 0.02 to 0.70. (Woodard-USGS)
W73-09786

SHORT-RANGE FORECAST OF MAXIMUM FLOOD DISCHARGES ON THE KYZYLSU RIVER AND ITS TRIBUTARIES (KARATKOSROCHNYY PROGNOZ MAKSIMAL'NYKH RASKHODOV PAVODKOV NA R. KYZYLSU I YEYE PRITOKAKH),
For primary bibliographic entry see Field 04A.
W73-09809

INTERNATIONAL HYDROLOGICAL DECADE (MEZHDUNARODNOYE GIDROLOGICHESKOYE DESYATILETIYE),
A. P. Safonov.
Meteorologiya i Gidrologiya, No 10, p 109-110, October 1972.

Descriptors: *International Hydrological Decade, *Conferences, *Hydrology, *Forecasting, *Rivers, Tributaries, Low flow, Navigation.
Identifiers: *USSR, *Danube River.

A meeting of representatives of IHD national committees was held in Varna, Bulgaria, May 29-June 1, 1972, to prepare for the Seventh Conference of Danube Countries on Hydrologic Forecasts. The meeting was attended by representatives of the national committees of Austria, Bulgaria, Hungary, the Federal Republic of Germany, Rumania, the USSR, Czechoslovakia, and Yugoslavia as well as by representatives of the secretariat of the Danube Commission and a working group of the Danube Commission on scientific hydrology of the Danube basin. The decision was made to hold the Seventh Conference in Varna for 6 days sometime between May 20 and June 10, 1973. The topics to be discussed include: (1) long-range and short-range hydrologic forecasts for the Danube River and its tributaries; (2) general theoretical problems and new directions in the development of hydrologic forecasting techniques; and (3) characteristic features of low-flow periods in 1971-72. The abstracts and papers of the conference are to be presented in either Russina or German and the summaries, in both languages. (Josefson-USGS)
W73-09810

SIMPLIFIED MATHEMATICAL MODEL OF TEMPERATURE CHANGES IN RIVERS,
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
For primary bibliographic entry see Field 05B.
W73-09867

HOW FREQUENTLY WILL FLOODS OCCUR,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W73-09992

MATERIALS OF THE ANNIVERSARY SESSION OF THE ACADEMIC COUNCIL (MATERIALY YUBILEYNOY SESSII UCHENOGO SOVETA).
Kazakhskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Alma-Ata (USSR).
For primary bibliographic entry see Field 02A.
W73-10048

STATISTICAL CHARACTERISTICS OF VELOCITY AND TEMPERATURE FIELDS IN ICE-COVERED BODIES OF WATER (STATISTICHESKIYE KHARAKTERISTIKI POLEY SKOROSTI I TEMPERATURY V VODOYEMAKH, POKRYTYKH L'DOM),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 02C.
W73-10052

WATER-TABLE FLUCTUATION IN SEMIPERVIOUS STREAM-UNCONFINED AQUIFER SYSTEMS,
California Univ., Davis.
For primary bibliographic entry see Field 02F.
W73-10058

FAUNISTIC ECOLOGICAL STUDY OF CREEKS OF EAST. FLANDERS AND THOSE ALONG SCHELDT RIVER: CONSIDERATIONS ON THEIR CHEMISTRY PLANTONIC, ENTOMOLOGICAL, AND MALACOLOGICAL FAUNA AND A DISCUSSION OF THEIR CURRENT BIOLOGICAL STATUS, (IN FRENCH),
Ghent Rijksuniversiteit (Belgium).
H. J. Dumont, and H. Gyselx.
Ann Soc R Zool Belg. Vol 101, No 3, p 157-181. 1971. Illus. English summary.

Identifiers: *Belgium, Biological studies, Chemistry, Conservation, Creeks, Ecological studies, *Fauna, Flanders, Invertebrates, Malacological fauna, Planktonic, Rivers, *Scheldt River.

In the north of the province of east Flanders, extending from some 30 km north-west of Ghent to north-west of Antwerp, and also along the river Scheldt, are many inland waters called 'kreken' (creeks) which are the remains of consecutive dike ruptures. The water of the creeks is slightly brackish: the chloride content generally varies between 0.6 and 1.8 g Cl/l. One southern creek however, more distant from the river, may be considered as a freshwater biotope (0.14 g Cl/l), while the northwest group is more brackish (2.2-3.65 g Cl/l). The creeks have well-buffered waters and are productive. As the waters mostly are oligohaline, many freshwater euryhaline species are present. Most characteristic are the invertebrates which are more or less confined to the brackish biotopes. Physico-chemical data obtained by water analysis and its importance in relation to animal life are added; finally a plea is made for conservation of these unique natural sites.--Copyright 1972, Biological Abstracts, Inc.
W73-10086

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA,
Geological Survey, St. Paul, Minn.
R. W. Maclay, T. C. Winter, and L. E. Bidwell.
Available from NTIS, Springfield, Va 22151, PB-218 965, Price $3.00 printed copy; $0.95 microfiche. Geological Survey Water-Resources Investigations 1-72, November 1972. 129 p, 49 fig, 5 tab, 77 ref.

Descriptors: Water resources, *Groundwater resources, *Water quality, *Minnesota, Surface waters, Groundwater, Water chemistry, Water yield, Water supply, Hydrogeology, Aquifers, Streamflow, Water pollution, Floods, Water balance, Glacial drift.
Identifiers: *Red River of the North (Minn).

Water problems in the Red River of the North basin in Minnesota include flooding, pollution, and water shortages. In the morainal area, problems generally are absent; but in the flat plain of former Glacial Lake Agassiz, they can be severe. About 5.1 million acre-feet of water is perennially available. Average annual flow in streams tributary to the Red River equals 1.7 inches over the basin. Runoff ranges from less than 1 to more than 4 inches. Glacial sand and gravel in the morainal and in the Halma-Lake Bronson areas are potentially large aquifers. Presently, other sand and gravel aquifers, generally local, provide most supplies. Much saline water occurs at depth in sedimentary rocks in the northwest part of the basin. Regionally, groundwater moves westward from morainal area to lake plain or Red River. Locally, groundwater in the morainal area moves from high areas to adjacent lowlands. Much deep moving water discharges at the east edge of the lake plain. Groundwater in recharge areas is generally calcium magnesium bicarbonate type. Sodium bicarbonate and sodium chloride type waters occur in association with Cretaceous and sedimentary rocks (in the northwest part of the basin), respectively. (Knapp-USGS)
W73-10321

REGIONAL ANALYSES OF STREAMFLOW CHARACTERISTICS,
Geological Survey, Washington, D.C.
H. C. Riggs.
Available from GPO, Washington, D.C. 20402, Price $0.45. Geological Survey Techniques of Water-Resources Investigations, Book 4, Chapter B3, 1973. 15 p, 4 fig, 2 tab, 34 ref.

Descriptors: *Streamflow, *Runoff, *Flow rates, *Regional analysis, *Data collections, Analytical techniques, Stochastic processes, Statistical methods, Low flow, Peak discharge, Average flow, Regression analysis, Correlation analysis, Hydrologic data, Stream gages, Gaging stations.
Identifiers: *Streamflow characteristics.

Regional analysis is concerned with extending records in space as differentiated from extending them in time. Because streamflow records are collected at only a few of the many sites where information is needed, gaging-station information must be transferred to ungaged sites. A regional analysis provides a tool for doing this. This manual describes various ways of generalizing streamflow characteristics and evaluates the applicability and reliability of each under various hydrologic conditions. Several alternatives to regionalization are briefly described. The manual is one of a series of manuals on techniques describing procedures for planning and executing specialized work in water-resources investigations. Material is grouped under major subject headings called books and further subdivided into sections and chapters; section B of book 4 is on surface water. (Woodard-USGS)
W73-10323

FIELD OBSERVATIONS OF EDGE WAVES,
Institute of Coastal Oceanography and Tides, Birkenhead (England).
D. A. Huntley, and A. J. Bowen.
Nature, Vol 243, No 5403, p 160-161, May 18, 1973. 2 fig.

Descriptors: *Waves (Water), *Surf, *Beaches, Littoral drift, Frequency analysis, Time series analysis, Fourier analysis.
Identifiers: *Edge waves.

Edge wave solutions are used for wave motion trapped against a shoaling beach. Their amplitude varies sinusoidally along the shore and diminishes rapidly seawards from the shoreline. Each solution is characterized by a mode number which gives the number of zero crossings in the seaward decay of amplitude; each mode has a dispersion relation linking the longshore wave number with the edge wave frequency. The existence of edge waves on natural shorelines may be inferred from the periodic spacing of rip currents and the existence of beach cusps and crescentic bars. Measurements of waves were made during August 1972 at Slapton Beach, South Devon, England. Spectral analyses of four pairs of 15-minute time series were made using the fast Fourier transform technique and smoothing filter. An unusual feature of the spectrum is the rather sharp peak at about 0.1 Hz, about one half of the predominant wind wave frequency. This energy peak occurs in each of the spectra and for both onshore and longshore components of the flow. The variation with offshore distance of this energy at 0.1 Hz suggests that it is due to the presence of an edge wave. The ratio of onshore to longshore current amplitudes is approximately constant, independent of offshore position, at 4.6. This is consistent only with the n±0 edge wave mode and would be inconsistent with any higher order mode. Because the value of the ratio is not unity, as would be expected for a progressive edge wave, the currents must be associated with a trapped standing edge wave. (Knapp-USGS)
W73-10327

REGIMES OF FORCED HYDRAULIC JUMP,
Alberta Dept. of Environment, Edmonton. Design and Construction Div.
For primary bibliographic entry see Field 08B.
W73-10331

EXPECTED NUMBER AND MAGNITUDES OF STREAM NETWORKS IN RANDOM DRAINAGE PATTERNS,
California Univ., Irvine.
For primary bibliographic entry see Field 04A.
W73-10335

2F. Groundwater

GROUNDWATER CONSITIONS IN THE CENTRAL VIRGIN RIVER BASIN, UTAH,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 04B.
W73-09791

GROUNDWATER RESOURCES OF MOTLEY AND NORTHEASTERN FLOYD COUNTIES, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-09792

GROUNDWATER RESOURCES OF HALL AND EASTERN BRISCO COUNTIES, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-09793

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF THE LOWER AROOSTOOK RIVER BASIN, MAINE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-09801

INVESTIGATIONS AND FORECAST COMPUTATIONS FOR THE CONSERVATION OF GROUNDWATER (ISSLEDOVANIYA I PROGNOZNYYE RASHETY DLYA OKHRANY PODZENMYKH VOD),
For primary bibliographic entry see Field 05B.
W73-09802

ROLE OF SUBSURFACE FLOW IN THE FORMATION OF THE SALT COMPOSITION OF THE CASPIAN SEA (O ROLI PODZEMNOGO STOKA V FORMIROVANII SOLEVOGO SOSTAVA KASPIYSKOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
R. G. Dzhamalov, I. S. Zektseri, N. V. Rodionov, and A. V. Meskheteli.
Meteorologiya i Gidrologiya, No 10, p 70-76, October 1972. 1 tab, 15 ref.

Descriptors: *Subsurface flow, *Subsurface runoff, *Groundwater movement, *Salt balance, *Sea water, Salinity, Ions, Aquifers, Surface runoff, Estimating.
Identifiers: *USSR, *Caspian Sea.

Quantitative estimates of subsurface discharge of dissolved ions are based on hydrodynamic calculations of subsurface flow into the Caspian Sea from shallow aquifers. Subsurface flow on the west coast of the Caspian is 1,159,389,500 cu m/yr, and the discharge of dissolved ions is 4,486,000 metric tons/yr. On the east coast, the volume of subsurface flow is 59,330,000 cu m/yr, and the discharge of dissolved ions is 588,300 metric tons/yr. On the Iranian coast of the Caspian, subsurface flow is 62,830,000 cu m/yr, and the discharge of dissolved ions is 314,000 metric tons/yr. Total subsurface flow into the sea reaches 1.3 cu km/yr, and total discharge of dissolved ions is 5,388,300 metric tons/yr. The amount of salts carried into the sea by surface runoff and subsurface flow is compared, and the importance of subsurface flow in the formation of the salt balance of seawater is discussed. (Josefson-USGS)
W73-09808

COMPUTER SIMULATION OF GROUND WATER AQUIFERS OF THE COASTAL PLAIN OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. K. Sherwani.
Available from the National Technical Information Service as PB-220 756, $3.00 in paper copy, $0.95 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No. 75, April 1973. 126 p, 19 fig, 7 tab, 25 ref, 2 append. OWRR B-005-NC (3). 14-01-0001-1931.

Descriptors: *Simulation analysis, Hydrologic models, Analog models, *Computer models, *Groundwater, Aquifers, *North Carolina, Model studies, Coastal plains, Pumping, Water quality, Saline water intrusion.
Identifiers: *Castle Hayne aquifer (NC), *Leaky aquifers, Sensitivity analysis.

The determination of the hydrologic characteristics of a leaky confined aquifer is approached from several viewpoints: (a) analysis of pumping tests, (b) fitting of steady-state mathematical models, (c) analog simulation, and (d) digital computer simulation. The Castle Hayne aquifer in eastern North Carolina is used as a case study. The aquifer is analyzed as a heterogeneous isotropic system. The inputs and outputs of the system are considered; the hydraulic connection between the aquifer and the underlying and overlying aquifers is examined. The verified digital model is used for prediction purposes under hypothetical strategies of development. The groundwater quality is considered to be of major importance in the optimal management of the aquifer on a regional bases. The vertical movement of the estuarine water and the lateral flow from lenses of poor quality water within the aquifer are examined using simple mathematical relationships. Single-valued estimates based on specific values of controlling parameters can be subject to large errors because of the accuracy of the data. The possible range of variation is investigated by carrying out sensitivity analysis. The conceptual problems in the measurement of social benefits and costs are outlined, and possible regulation techniques are explored. A possible framework for the regional management of the aquifer taking quality of water and economic consequences into account is presented.
W73-09871

DRAWDOWN AND RECOVERY OF AN ARTESIAN SAND AND GRAVEL AQUIFER, LONDON, ONTARIO, CANADA,
Ontario Water Resources Commission, Toronto. Div. of Water Resources.
D. N. Jeffs, and A. A. Mellary.
Proc available from 24th Int Geological Congress, 601 Booth St, Ottawa, Canada KIA OE8 Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 5-15, 1972. 6 fig, 1 tab, 8 ref.

Descriptors: *Drawdown, *Recharge, *Withdrawal, *Artesian aquifers, Groundwater movement, Canada, Hydrogeology, Aquifer characteristics, Sands, Gravels, Glacial drift, Water levels, Water yield.
Identifiers: *London (Ontario).

Drawdown and recovery were studied in the White Oak aquifer, London, Ontario, using six high-capacity wells operated from 1959 to 1967. Production from the wells totaled 7,500 million imperial gallons. The aquifer consists of sand and gravel, interbedded with lenses of silt, clay and till, and is overlain generally by till and local surface deposits of clay, silt and sand. It has a maximum thickness of approximately 150 feet. In an observation well about 6,000 feet east of the production area, the maximum drawdown was 74 feet, and the residual drawdown 4 years after pumping ceased was 53 feet. The production dewatered a significant portion of the aquifer. Most of the water released from storage was from the dewatered portion. The volume of water which was released from the dewatered portion and from the confined portions of the aquifer was compared with the total production and the difference attributed to recharge. Storage coefficients range from 0.03 to 0.04 in the dewatered portion of the aquifer. Recharge rate was 40,000 to 50,000 imperial gallons per day per square mile during the production period. (Knapp-USGS)
W73-09948

OBSERVATIONS ON MESOZOIC SANDSTONE AQUIFERS IN SAUDI ARABIA,
Ministry of Agriculture and Water, Riyadh (Saudi Arabia).
G. Otkun.
Proc available from 24th Int Geological Congress, 601 Booth St, Ottawa, Canada KIA OE8 Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 28-35, 1972. 1 fig, 4 tab, 8 ref.

Descriptors: *Aquifers, *Water yield, *Hydrogeology, Sandstones, Water balance, Groundwater movement, Water quality.
Identifiers: *Saudi Arabia.

In Saudi Arabia all water requirements are supplied from groundwater. Because the rainfall is very low and irregular, and temperatures and evaporation very high, the floods which occur once in a while either infiltrate underground and/or evaporate before reaching the sea. The extent, water movement, and chemical and hydraulic characteristics of two main sandstone aquifers of Mesozoic age are discussed along with the results obtained from isotopic analyses of the samples collected from deep boreholes. These aquifers are the Minjur of the Upper Triassic and the Wasia of the Middle Cretaceous. The Minjur formation is sandstone with some shale of littoral-continental facies. It is productive almost everywhere, but varies in quality and aquifer characteristics. The age of its water ranges between 10,000 and 35,000 years. The Wasia formation is also sandstone and shale of marine and nonmarine origin. It can be followed from north to south over a length of 1,450 km and, despite variation in quality, it is one of the country's most prolific aquifers. (Knapp-USGS)
W73-09949

ESTIMATING THE YIELD OF THE UPPER CARBONATE AQUIFER IN THE METROPOLITAN WINNIPEG AREA BY MEANS OF A DIGITAL MODEL,
F. W. Render.
Proc available from 24th Int Geological Congress, 601 Booth St, Ottawa, Canada KIA OE8 Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 36-45, 1972. 6 fig, 8 ref.

Descriptors: *Safe yield, *Mathematical models, *Simulation analysis, *Hydrogeology, Withdrawal, Water levels, Drawdown, Limestones, Permeability, Fracture permeability, Storage coefficient, Canada.
Identifiers: *Winnipeg (Manitoba), Secondary permeability.

An extensive confined aquifer, pumped at a rate of 3 thousand million gallons per year, is in the fractured and jointed upper 100 feet of the thick Paleozoic carbonate rock sequence underlying metropolitan Winnipeg. Groundwater withdrawals have created a major drawdown come in the central industrial area. Pumpage varies from 5 mgd in the winter months to 10 mgd during the summer.

The increased summer withdrawals cause temporary declines in the piezometric surface. A digital model of the Upper Carbonate aquifer was constructed with a storage coefficient of 0.001. The simulated drawdown correlated reasonably well with the field data. The model did not duplicate the long-term hydraulic response of the aquifer. The storage coefficient was altered to 0.00001, and increased vertical recharge was simulated as being proportional to the drawdown. The revised model simulated a more realistic aquifer response to long-term pumpage. (Knapp-USGS)
W73-09950

GROUNDWATER RESEARCH IN THE OPEN--CAST MINING AREA OF THE SOUTHERN NIEDERRHEIN-BUCHT (WEST GERMANY),
Geologisches Landesamt Nordrhein-Westfalen, Krefeld (West Germany).
K. D. Balke, D. Jacob, and H. Karrenberg.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 49-58, 1972. 9 fig, 7 ref.

Descriptors: *Hydrogeology, *Water balance, *Withdrawal, *Coal mines, *Drawdown, Water yield, Saline water intrusion, Aquifers, Artesian aquifers, Groundwater movement.
Identifiers: *Niederrhein-Bucht (West Germany).

The Niederrhein-Bucht, West Germany, is a graben formed in the Tertiary period. The Tertiary sediment filling, over 1,000 m thick, consists of gravels, sands, and clays interspersed with many brown coal seams. Pleistocene rubble and loess of varying thickness form the top layer. Since 1955, in the course of draining deep open-cast brown coal mines, a considerable lowering of the water table of the uppermost aquifer has taken place. At the same time this has involved a pressure loss of confined waters in deeper aquifers. In October 1968 the extent of the recession at the open-cast Frechen mine was 260 m below the surface. The recession of the water table over a large area leads to a pressure reduction of the deeper groundwater. This should cause the deeper, more saline groundwater ro rise. Groundwaters of a higher temperature and of greater mineralization have been observed for some time at several places, particularly at the Ville Block. (Knapp-USGS)
W73-09951

PROBLEMS OF GROUNDWATER EXPLORATION IN METAMORPHIC ROCKS FOR DOMESTIC WATER SUPPLIES IN NORTHEASTERN BRAZIL,
Bundesforschungsanstalt fuer Bodenforschung, Hanover (West Germany).
K. Kreysing, R. Lenz, and W. Muller.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 73-79, 1972. 4 fig, 12 ref.

Descriptors: *Groundwater resources, *Saline water, *South America, *Hydrogeology, Salinity, Water quality, Groundwater movement, Infiltration, Water yield, Water resources development.
Identifiers: *Brazil.

Groundwater salinity, its causes and distribution were studied in the crystalline basement in northeastern Brazil. The project area is situated about 650 km west of Recife, on the middle course of the Rio Sao Francisco. About 80% of the groundwater is so heavily salted that it cannot be used as drinking water. Two basically different groups of groundwater reservoirs can be distinguished within the deeper lying groundwater resources: (1) isolated groundwater reservoirs largely sealed by aquifuges; and (2) groundwater reservoirs in the old massive crystalline rocks, taking part in the regional groundwater migration. Groundwater of drinking-water quality is only to be found within orographic uplift areas, where favorable slope conditions led to an increased velocity of flow of the groundwater in the aquifer; great distances to the ground surface are a protection against evaporation from the aquifer, and a thin soil cover facilitates a direct and rapid infiltration. Within regions of quartzite ridges and inselbergs there are isolated groundwater resources of freshwater quality. (Knapp-USGS)
W73-09952

THE METHODS OF EXPLORATION OF KARST UNDERGROUND WATER FLOWS IN POPOVO POLJE, YUGOSLAVIA,
Trebisnica Hydrosystem, Trebinje (Yugoslavia).
P. Milanovic.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada, KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 80-88, 1972. 8 fig, 2 ref.

Descriptors: *Karst hydrology, *Exploration, *Hydrogeology, Borehole geophysics, Investigations, Seismic studies, Groundwater movement, Aquifer characteristics.
Identifiers: *Yugoslavia.

Development of water power at Trebisnjica, Yugoslavia, required detailed hydrogeological exploration of the lowest part of the karst terrain of Popovo Polje, in which construction of a storage compensation reservoir was planned. After geological and hydrogeological maps were prepared and the results of exploratory drilling were obtained, other conventional methods such as geoelectrical mapping and sounding, dye tracers, and speleology were applied. The complexity of the problems required application of new methods, including gamma-gamma logging, radioactive tracers, TV-cameras, diving speleology, time-bomb seismic studies, and stereo photography. The hypothesis that the anticlinal dolomite core functions as a hydrogeological barrier was proved. Also the spatial position of underground water flows was determined. Important data on high velocities of the groundwater flow in the zone of swallow holes were obtained. Radioactive isotopes, time-bomb and stereo photo-camera studies proved to be especially useful. (Knapp-USGS)
W73-09953

DETERMINATION OF HYDROGEOLOGICAL PROPERTIES OF FISSURED ROCKS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 02J.
W73-09954

TIDAL FLUCTUATIONS IN A CONFINED AQUIFER EXTENDING UNDER THE SEA,
Vrije Universiteit, Amsterdam (Netherlands). Inst. of Earth Sciences.
G. Van der Kamp.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 101-106, 1972. 3 fig, 3 ref.

Descriptors: *Water level fluctuations, *Tides, *Artesian aquifers, *Confined water, Barometric efficiency, Compressibility, Hydraulic gradient, Surface-groundwater relationships.

Tidal fluctuations in sea level can induce corresponding fluctuations of groundwater pressure in underlying confined aquifers. Two different phenomena are involved: the initiation of the fluctuations by compression of the subsea portion of the aquifer, and their propagation landwards. Measurement of such fluctuations can yield information on the aquifer parameters. The continuity of flow between the subsea and inland regions is taken into account for the case of a completely confined aquifer. The existing theory was modified. The new theory allows an acceptable treatment of cases involving adjacent land-sea boundaries such as that of a narrow channel. Some empirical data are presented which support the theoretical results. (Knapp-USGS)
W73-09955

CONCEPTUAL MODELS FOR EVALUATION OF THE SUBTERRANEAN WATER CYCLE IN PALEOZOIC HIGHLANDS,
Bonn Univ. (West Germany). Institut fuer Geologie.
K. U. Weyer.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 107-117, 1972. 12 fig, 2 ref.

Descriptors: *Water balance, *Groundwater movement, *Hydrologic cycle, *Hydrogeology, Model studies, Systems analysis, Rainfall-runoff relationships, Surface-groundwater relationships, Hydrograph analysis, Recharge, Infiltration.
Identifiers: Rheinisches Schiefergebirge.

Several conceptual models are described which are useful for the evaluation of soil moisture and groundwater flow systems in mountainous terranes such as the Rheinisches Schiefergebirge. In these mountains groundwater flows in the fractures, joints and cleavage planes of the bedrock. In both bedrock and residual soil the water flows within two distinct hydraulic networks. In residual soil this involves movement of water through pores smaller than about 50 micrometers, and movement through pores larger than about 50 micrometers (root holes, cracks, decayed-root channels and earthworm holes). In bedrock water moves through joints, bedding joints, cleavage planes and hydraulically ineffective faults, and through hydraulically very effective open faults. Under normal conditions the main groundwater recharge is not decisively influenced by vegetation, because this recharge does not occur during the vegetation period. Because the relationship between groundwater and base runoff is usually linear and time invariant, the hydrologic pattern of the bedrock and groundwater recharge can be satisfactorily determined from the discharge of the channels. (Knapp-USGS)
W73-09956

ASSESSMENT OF GROUNDWATER RECHARGE IN THE UPPER TARNAK BASIN OF AFGHANISTAN,
United Nations Development Program, New York.
V. R. Dixon, and D. Duba.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 130-138, 1972. 1 fig, 2 tab.

Descriptors: *Recharge, *Withdrawal, *Water balance, Groundwater basins, Hydrogeology, Alluvium, Water levels, Groundwater movement, Groundwater recharge.
Identifiers: *Afghanistan.

The physiography, geology, and hydrometeorology of the semiarid Upper Tarnak basin of Afghanistan are briefly described. The main aquifers are in the alluvial and colluvial sediments of Recent age. Phreatic conditions exist in places, particularly in the fanheads and along the valley flanks, whereas leaky artesian conditions are evident in the middle and lower fans and valley center. Groundwater levels are more than 10 m below the ground surface throughout most of the valley and in places exceed 50 m. Measured permeabilities vary from 6 m/day to more than 170 m/day. Infiltration of runoff from the mountains is by far the most important source of groundwater recharge. The direct infiltration of precipitation, and infiltration from streams in the valley center, appears to be negligible. Large groundwater withdrawals by means of karez amount to 190 million cu m annually. The amount is equivalent to about 14% of the total precipitation on the basin for an average year, 44% of the precipitation falling on the mountains during the December-April season, and 95% of the latter precipitation minus basin evaporation. (Knapp-USGS)
W73-09957

THE RELATIONSHIP BETWEEN RAINFALL, GEOMORPHIC DEVELOPMENT AND THE OCCURRENCE OF GROUNDWATER IN PRECAMBRIAN ROCKS OF WESTERN AUSTRALIA,
K. H. Morgan.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 143-152, 1972. 3 fig, 2 tab, 7 ref.

Descriptors: *Hydrogeology, *Water quality, *Geomorphology, *Australia, Water balance, Leaching, Laterites, Salinity, Groundwater basins, Erosion, Climates.
Identifiers: *Western Australia.

In Western Australia, groundwater quality and quantity in regions underlain by crystalline rock are related primarily to the climatic and geomorphic regimes. Where precipitation is confined to the summer months, the groundwater is less saline than comparable regions with winter rain. Areas with misty winter rains tend to have poorer quality groundwater. The two geomorphic divisions are areas of regenerated erosion and those of ancient landscape with recognizable elements of staged development. Permeability, storage, and rainfall intake can be related to the stages of weathering, leaching, lateritization, and erosion. Laterite at the headwaters of the ancient river systems has undergone several stages of leaching and is more permeable than younger laterites in higher rainfall areas. Post-Miocene erosion in the Eastern Goldfields stripped the lower reaches of the ancient drainages to expose less-leached relatively impermeable parts of the laterite profile. The high groundwater salinities are derived from ancient accumulations of saline water as well as from salinity buildup caused by low rainfall on the low-permeability soils. (Knapp-USGS)
W73-09958

PROPERTIES AND MANIFESTATIONS OF REGIONAL GROUNDWATER MOVEMENT,
Research Council of Alberta, Edmonton.
J. Toth.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 153-163, 1972. 11 fig, 29 ref.

Descriptors: *Groundwater movement, *Groundwater basins, *Hydrogeology, Aquifers, Confined water, Artesian aquifers, Subsurface waters, Surface-groundwater relationships, Water balance, Water yield, Water chemistry.
Identifiers: *Regional groundwater movement.

It is possible to evaluate theoretically the general properties of the regional movement of groundwater and to make prognoses of its natural manifestations. Analysis of flow patterns suggests that manifestations of regional movement are: areas of inflow, lateral flow, and outflow showing water levels declining, constant, and rising, respectively; flowing well conditions in areas of outflow; thinning of the phreatic belt from the divide toward the valley bottom; change in the rate of water transfer between the atmosphere and saturated zone from a maximum demand at the divide to a maximum yield at the valley bottom; relatively low mineralization of groundwater in recharge areas, and relatively high concentrations in discharge areas; abrupt differences in water types across flow-system boundaries; accumulation of dissolved, suspended, emulsified and colloidal matter at stagnant zones; humid conditions in areas of outflow relative to areas of inflow, reflected by differences in vegetation and by distribution and intensity of springs, seeps, soil erosion and salinization; near-surface reversals of flow direction; anomalous groundwater levels reflecting permeability differences at depth; and negligible direct groundwater contribution to streams. (Knapp-USGS)
W73-09959

AQUIFER PROPERTIES OF THE BUNTER SANDSTONE IN NOTTINGHAMSHIRE, ENGLAND,
Bristol Univ. (England). Dept. of Geology.
B. P. J. Williams, R. A. Downing, and P. E. R. Lovelock.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 169-176, 1972. 3 fig, 9 ref.

Descriptors: *Hydrogeology, *Groundwater movement, *Sandstones, *Aquifer characteristics, Cores, Laboratory tests, Aquifer testing, Permeability, Hydraulic conductivity, Artificial recharge, Correlation analysis.
Identifiers: *England, Bunter sandstone.

The Bunter Sandstone (Lower Triassic) is a fluvial red-bed sequence of sandstones and conglomerates with occasional thin mudstones. It is an important aquifer in England. A detailed laboratory investigation of the physical and hydrological properties of core samples was made and the results compared with field data derived from pumping tests. The purpose was to assess the hydraulic conductivity of the Sandstone, using small-diameter boreholes to assist in the selection of sites for artificial recharge. The relationships between physical and hydrological properties were influenced by the laminated nature of the Sandstone and by cementation; correlation coefficients were low. The best relationships were between vertical hydraulic conductivity and median grain size, and between vertical hydraulic conductivity and the smaller grain sizes. The laboratory results were compared with field pumping tests. Values for vertical hydraulic conductivity were similar, but horizontal hydraulic conductivities determined in the laboratory were significantly lower than those derived from pumping tests because groundwater movement is controlled by fissures accentuated by subsidence due to the mining of coal in the underlying rocks. (Knapp-USGS)
W73-09960

REGIONALIZATION OF HYDROGEOLOGIC PARAMETERS FOR USE IN MATHEMATICAL MODELS OF GROUNDWATER FLOW,
IBM Watson Research Center, Yorktown Heights, N.Y.
R. A. Freeze.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 177-190, 1972. 13 fig, 26 ref.

Descriptors: *Mathematical models, *Simulation analysis, *Groundwater movement, Hydraulic conductivity, Moisture content, Hydrogeology, Saturated flow, Unsaturated flow, Statistical methods, Numerical analysis, Anisotropy.

The weakest links in the use of deterministic mathematical models of groundwater flow lie in the scarcity of available data, and in the absence of reliable techniques to extract representative parameters from the data which do exist. For steady-state, saturated-unsaturated flow systems, the necessary hydrogeologic parameters are the pressure-head-dependent functions of hydraulic conductivity and moisture content. It is possible to effectively reduce these complex functions to a two-parameter representation in saturated hydraulic conductivity and a parameter that can be determined from the moisture content curve. Input values for mathematical simulations are best determined from statistical analyses of the available measured values. The hydraulic conductivity data commonly form a lognormal frequency distribution. From these data, it is possible to calculate a probability distribution for the geometric mean value of hydraulic conductivity for a given formation, or for the ratio of geometric means of two adjacent formations. This allows presentation of quantitative results in the form of statistical probability functions, rather than as single-valued solutions of unknown reliability. (Knapp-USGS)
W73-09961

ON THE GEOMETRICAL BASIS OF INTRINSIC HYDROGEOLOGIC PARAMETERS IN POROUS MEDIA FLOW,
Minnesota Univ., Minneapolis. Dept. of Geology and Geophysics.
H-O. Pfannkuch.
Proc available from Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 191-200, 1972. 4 fig, 1 tab, 26 ref.

Descriptors: *Porous media, *Groundwater movement, *Pores, Porosity, Hydrogeology, Mass transfer Electrolytes, Interstices, Diffusion, Dispersion, Hydraulic conductivity, Permeability.
Identifiers: Formation factor.

Intrinsic geometric properties of porpous media were defined on a microscopic scale. These properties are then compared to characteristic lengths of interest in transport processes. Characteristic length dimensions of pores are analyzed in thin sections and through transport processes in consolidated materials. The parameters discussed are porosity, permeability, relative roughness of pore channels, dispersivity, tortuosity and the formation factor concept. A very precise assessment even of secondary geometric effects such as internal surface roughness and overgrowths is necessary. The discrepancy between the microscopic geometric parameters and measured expected results of transport experiments based on these lengths may lead to a better insight into the transport process itself. For electrolyte conductance the influence of the internal specific surface area is demonstrated, while the discrepancy between

the mass dispersion coefficients in unconsolidated and consolidated porous media still needs a more consistent explantation on the basis of the microgeometry of the medium. (Knapp-USGS)
W73-09962

THE PRINCIPLES OF PALEOHYDROGEOLOGICAL RECONSTRUCTION OF GROUND-WATER FORMATION,
Akademiya Navuk BSSR, Minsk. Institut Geologicheskikh Nauk.
G. V. Bogomolov, A. A. Kartsev, G. P. Yakobson, and Yu. G. Bogomolov.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 205-207, 1972. 8 ref.

Descriptors: *Paleohydrology, *Hydrogeology, *Hydrologic cycle, *Water chemistry, Brines, Ion exchange, Infiltration, Groundwater movement, Investigations, Exploration.

Paleohydrogeological reconstructions are very important to theoretical hydrology and prospecting for groundwaters. The principles of paleohydrogeological reconstructions are based on the concept of the cyclic character of the processes of groundwater formation. Paleohydrodynamic estimates are based mainly on geological data, and those for infiltration stages on the principle of uniformity. Paleohydrogeochemical reconstructions are based on paleogeographic and lithologic data. The combination of approximate paleohydrodynamic estimates and paleohydrogeochemical reconstructions shows some important regularities of the distribution of groundwater and brines of different composition and predicts their yields. Paleohydrogeological investigations assist in prospecting for some other useful minerals. (Knapp-USGS)
W73-09963

GEOCHEMICAL PROCESSES IN SHALLOW GROUNDWATER FLOW SYSTEMS IN FIVE AREAS IN SOUTHERN MANITOBA, CANADA,
Waterloo Univ. (Ontario). Dept. of Earth Sciences.
J. A. Cherry.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 208-221, 1972. 2 fig, 3 tab, 22 ref.

Descriptors: *Geochemistry, *Hydrogeology, *Groundwater movement, Canada, Ion exchange, Clay minerals, Clays, Glaciation, Paleohydrology, Carbonates, Sulfates, Chlorides, Brines.
Identifiers: *Canada (Manitoba).

The hydrochemistry of groundwater in overburden and shallow bedrock formations in five hydrogeologic environments in southern Manitoba was investigated by test drilling and by sampling of piezometer networks and domestic wells. Chemical analyses were interpreted by saturation with respect to calcite, dolomite and gypsum, and by simple dissolution models involving carbonate, sulfate and chloride minerals. Ion complexing was accounted for in the saturation calculations. The cation concentrations have probably been modified by exchange processes involving clay minerals. The presence of sulfate and chloride minerals in the overburden is attributed to Pleistocene glacial loading of the western Canadian sedimentary basin. Excess pore pressures caused by ice loading may have forced deep brines in Paleozoic formations to flow into aquifers of southern Manitoba. Soluble salts would have precipitated from the brines due to decreases in temperature and pressure. (Knapp-USGS)
W73-09964

GROUNDWATER FLOW SYSTEMS, PAST AND PRESENT,
Department of the Environment (Alberta). Inland Waters Branch.
L. D. Delorme.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 222-226, 1972. 2 tab, 3 ref.

Descriptors: *Paleohydrology, *Groundwater movement, *Lakes, *Surface-groundwater relationships, Springs, Recharge, Discharge (Water), Land reclamation, Climates, Water quality.

The hydrological regime of a lake or pond is a function of time, climate and geology. Geology can be considered to be constant for the history of such a surface-water body whereas climate can be shown, through the use of fossils, not to be constant in time. As climate influences the nature of groundwater flow systems to and from the lake or pond, the present groundwater flow system is not necessarily the one that has always been there. A correlation can be shown between permanency, chemistry and the depth and direction of the groundwater flow system. Shelled organisms, such as ostracodes and snails provide a means to determine the state of permanency and the chemistry of the lake or pond during specific times in the past. They can, therefore, be used with other evidence to decipher the changing nature of the groundwater flow systems through time. The knowledge gained from such an analysis could help in making land reclamation decisions. (Knapp-USGS)
W73-09965

BASIC STUDIES IN HYDROLOGY AND C-14 AND H-3 MEASUREMENTS,
Niedersaechsisches Landesamt fuer Bodenforschung, Hanover (West Germany).
M. A. Geyh.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 227-234, 1972. 6 fig, 1 tab, 24 ref.

Descriptors: *Paleohydrology, *Carbon radioisotopes, *Tritium, *Glaciation, *Recharge, Saline water-freshwater interfaces, Europe, South America, Karst, Groundwater movement, Paleoclimatology, Lakes, Sedimentation, Geochemistry, Radioactive dating.

Interrelations among the initial C-14 concentration of groundwater, geologic features of catchment areas and aquifers, as well as palaeoclimatic fluctuations, were studied using 624 groundwater samples from central Europe and Brazil. Groundwaters recently recharged in the karst of southern Germany, in regions covered by loess, and in the crystalline rocks of northeast Brazil have diverse initial C-14 concentrations as a consequence of specific geochemical features of the catchment areas and different mean residence times. Variations of the groundwater recharge rate over the last 30,000 years are reflected in the C-14 age distribution of the groundwater in a confined aquifer in South Germany, in the C-14 age sequence of the saltwater-freshwater interface on the North Sea coast, as well as in the C-14 histogram based on 103 dates for central European groundwaters. The groundwater recharge rate of the Holocene may have been three times greater than that of the time before 20,000 B.P. No groundwater was recharged during the period from 20,000 to 13,000 B.P. in central Europe, simultaneous with the recession in the formation of apeleothems in the production of organic matter. (Knapp-USGS)
W73-09966

A PRELIMINARY STUDY OF THE GEOCHEMICAL CHARACTERISTICS OF THERMAL WATERS IN NEW MEXICO,
New Mexico Inst. of Mining and Technology, Socorro.
W. K. Summers, and R. A. Deju.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 241-250, 1972. 3 fig, 3 tab, 9 ref.

Descriptors: *Water chemistry, *Thermal water, *New Mexico, Leaching, Equilibrium, Hot springs, Calcium, Sodium, Potassium Magnesium, Geothermal studies, Thermal springs.

The geologic and hydrologic settings of nine thermal springs in New Mexico that discharge groundwater from igneous rocks are described. These spring areas constitute a representative cross section of igneous terrains. In laboratory experiments, rock particles were leached in a dilute HCl solution. The following factors have an effect on the water chemistry: the initial pH of the solution; the atmosphere under which the experiment is conducted; the presence of extraneous or free ions such as sulfur; and the surface area of the particles. The total amount of monovalent cations plus calcium and magnesium entering the solution increased in proportion to increases of these constituents in the rock matrix. The ratios of Ca to Na and K to Mg in the groundwater discharging at Ponce de Leon Warm Spring, Hot Spring Rio San Antonio, and Warm Spring Rio San Antonio are essentially the same as those of the rock at each spring. No similar relation exists at the other sites investigated. It seems that the water and the rock in these three areas are nearly in ionic equilibrium, whereas the others are not. (Knapp-USGS)
W73-09967

THE APPLICATION OF THE TRANSPORT EQUATIONS TO A GROUNDWATER SYSTEM,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 05B.
W73-09968

SOURCE DETERMINATION OF MINERALIZATION IN QUATERNARY AQUIFERS OF WEST--CENTRAL KANSAS,
Kansas State Dept. of Health, Dodge City.
For primary bibliographic entry see Field 05B.
W73-09969

VARIATIONS OF GROUNDWATER CHEMISTRY BY ANTHROPOGENIC FACTORS IN NORTHWEST GERMANY,
Niedersaechsisches Landesamt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 05B.
W73-09970

HYDROGEOLOGIC CRITERIA FOR THE SELF-PURIFICATION OF POLLUTED GROUNDWATER,
Hessiches Landesamt fuer Bodenforschung, Wiesbaden (West Germany).
For primary bibliographic entry see Field 05B.
W73-09971

GROUNDWATER IN PERSPECTIVE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 04B.

W73-09994

THE REGIONAL SETTING,
Institute of Geological Sciences, London (England).
For primary bibliographic entry see Field 08A.
W73-10002

SUBSURFACE WASTE STORAGE--THE EARTH SCIENTIST'S DILEMMA,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 05E.
W73-10022

INJECTION WELLS AND OPERATIONS TODAY,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05B.
W73-10023

SUBSIDENCE AND ITS CONTROL,
Geological Survey, Sacramento, Calif.
For primary bibliographic entry see Field 04B.
W73-10024

RESPONSE OF HYDROLOGIC SYSTEMS TO WASTE STORAGE,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 05B.
W73-10025

GEOMETRY OF SANDSTONE RESERVOIR BODIES,
Shell Oil Co., Houston, Tex.
R. J. LeBlanc.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 133-189, 1972. 35 fig, 4 tab, 568 ref.

Descriptors: *Aquifer characteristics, *Sedimentation, *Sandstones, Hydrogeology, Stratigraphy, Alluvium, Beaches, Turbidity currents, Deltas, Dunes, Aquifers, *Bibliographies.
Identifiers: *Sandstone aquifers.

Sandstones are important natural underground reservoirs capable of containing water, petroleum, and gases. The principal sandstone-generating environments are (1) fluvial environments such as alluvial fans, braided streams, and meandering streams; (2) distributary-channel and delta-front environments; (3) coastal barrier ialands, tidal channels, and chenier plains; (4) desert and coastal eolian plains; and (5) deeper marine environments. The most common sandstone reservoirs are of deltaic origin. They consist of two types: delta-front or fringe sands and abandoned distributary-channel sands. Fringe sands are sheetlike, and their landward margins are abrupt. Seaward, these sands grade into the finer prodelta and marine sediments. Distributary-channel sandstone bodies are narrow, they have abrupt basal contacts, and they decrease in grain size upward. They cut into, or completely through, the fringe sands and also connect with upstream fluvial sands. Some of the more porous and permeable sandstone reservoirs consist of well-sorted beach and shoreface sands associated with barrier islands and tidal channels. Barrier sand bodies are long and narrow, are aligned parallel with the coastline, and are characterized by an upward increase in grain size. The most porous and permeable sandstone reservoirs are products of wind activity in coastal and desert regions. Eolian sands are very well sorted, highly crossbedded, and they occur as extensive sheets. (Knapp-USGS)
W73-10026

APPLICATION OF TRANSPORT EQUATIONS TO GROUNDWATER SYSTEMS,
Geological Survey, Denver, Colo.
For primary bibliographic entry see Field 05B.
W73-10027

CIRCULATION PATTERNS OF SALINE GROUNDWATER AFFECTED BY GEOTHERMAL HEATING--AS RELATED TO WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 05B.
W73-10028

CHEMICAL EFFECTS OF PORE FLUIDS ON ROCK PROPERTIES,
Texas A and M Univ., College Station. Coll. of Geosciences.
For primary bibliographic entry see Field 02K.
W73-10029

NATURAL AND INDUCED FRACTURE ORIENTATION,
Geological Survey, Washington, D.C.
M. K. Hubbert.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla American Association of Petroleum Geologists Memoir 18, p 235-238, 1972. 6 ref.

Descriptors: *Rock mechanics, *Fractures (Geologic), *Injection wells, *Underground waste disposal, *Geologic control, Water pressure, Strength, Stress, Strain, Fracutre permeability, Rock properties, Hydrogeology, Aquifer characteristics, Waste disposal wells.
Identifiers: *Hydraulic fracturing (Rocks).

Fractures may be induced in rocks by fluid pressures applied through wells. Hydraulically induced fractures tend to follow surfaces parallel with the greatest and intermediate principal compressive stresses and perpendicular to the least stress. In tectonically relaxed regions characterized by normal faulting, the greatest principal stress in nearly vertical and the intermediate and least principal stresses are nearly horizontal. In such a region, the preferred orientation of hydraulic fractures is vertical, perpendicular to the least principal stress, and parallel with the strike of the local normal faults. Hydraulic fracture orientation may also be influenced by anisotropy or planar inhomogeneities in the rock such as bedding, schistose cleavage, or a system of parallel joints. If such a planar system does not depart too far from perpendicularity to the axis of least stress, hydraulic fractures may follow such a zone of weakness. In this case, provided the rocks are also stressed tectonically, slippage along the fracture and possible resultant earthquakes are possible consequences of increasing the fluid pressure in the rock. (Knapp-USGS)
W73-10030

MECHANICS OF HYDRAULIC FRACTURING,
Geological Survey, Washington, D.C.
M. K. Hubbert, and D. G. Willis.
In Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 239-257, 1972. 26 fig, 22 ref.

Descriptors: *Rock mechanics, *Fractures (Geologic), *Injection wells, *Underground waste disposal, *Geologic control, Water pressure, Strength, Stress, Strain, Fracture permeability, Rock properties, Hydrogeology, Aquifer characteristics, Waste disposal wells.
Identifiers: *Hydraulic fracturing (Rocks).

The fracturing of rocks by means of pressure applied in boreholes is examined theoretically. Regardless of whether the fracturing fluid is of the penetrating or nonpenetrating type, the fractures produced should be approximately perpendicular to the axis of least stress. For tectonically relaxed areas characterized by normal faulting, the least stress should be horizontal; the fractures produced should be vertical, and the injection pressure should be less than that of the overburden. In areas of active tectonic compression, the least stress should be vertical and equal to the pressure of the overburden; the fractures should be horizontal, and injection pressures should be equal to, or greater than, the pressure of the overburden. Horizontal fractures cannot be produced by hydraulic pressures less than the total pressure of the overburden. These conclusions are compatible with field experience in fracturing and with the results of laboratory experimentation. (Knapp-USGS)
W73-10031

HYDRODYNAMICS OF FLUID INJECTION,
California Univ., Berkeley.
For primary bibliographic entry see Field 05B.
W73-10032

EARTHQUAKES AND FLUID INJECTION,
National Center for Earthquake Research, Menlo Park, Calif.
C. B. Raleigh.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 273-279, 1972. 4 fig, 11 ref.

Descriptors: *Injection wells, *Secondary recovery (Oil), *Waste disposal wells, *Earthquakes, *Colorado, Fractures (Geologic), Faults (Geologic), Pressure, Pore pressure, Hydrogeology, Permeability, Structural geology, Stress, Strain.
Identifiers: *Denver (Colo).

Earthquakes are clearly linked to subsurface fluid injection in wells near Denver at the Rocky Mountain Arsenal waste-disposal well and at the Rangely oil field in northwestern Colorado. The theory linking fluid pressure to earthquakes is based on the effective stress concept; increases of pore pressure reduce the effective normal stress across fracture surfaces. At both the Rocky Mountain Arsenal and Rangely, evidence exists for substantial tectonic shearing stresses in the reservoir rock, although stress is below the critical value necessary to cause failure. At Denver, fluid injection relieved frictional resistance to shear fracture, and earthquakes resulted. There is presently no way to determine before drilling whether injection at a given site will produce earthquakes. At Denver and Rangely, the earthquakes originated entirely along preexisting faults. In placement of injection wells, existing faults should be avoided. Seismic surveillance during injection can provide early warning of inadvertently triggered earthquakes. At Rangely, the earthquakes have been drastically reduced in frequency by reducing pore pressures in the hypocentral region. (Knapp-USGS)
W73-10033

WATER-MINERAL REACTIONS RELATED TO POTENTIAL FLUID-INJECTION PROBLEMS,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 05B.
W73-10034

NATURAL-MEMBRANE PHENOMENA AND SUBSURFACE WASTE EMPLACEMENT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10035

GEOCHEMICAL EFFECTS AND MOVEMENT OF INJECTED INDUSTRIAL WASTE IN A LIMESTONE AQUIFER,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W73-10036

RECENT SUBSIDENCE RATES ALONG THE TEXAS AND LOUISIANA COASTS AS DETERMINED FROM TIDE MEASUREMENTS,
National Ocean Survey, Rockville, Md.
For primary bibliographic entry see Field 02L.
W73-10045

USE OF INFRARED AERIAL PHOTOGRAPHY IN IDENTIFYING AREAS WITH EXCESS MOISTURE AND GROUNDWATER OUTFLOW (OB ISPOL'ZOVANII INFRAKRASNOY AEROS 'YEMKI PRI VYYAVLENII UCHASTKOV IZBYTOCHNOGO UVLAZHNENIYA I VYKHODOV PODZEMNYKH VOD),
Nauchno-Issledovatelskii Institut Geologii Arktiki, Leningrad (USSR).
For primary bibliographic entry see Field 07B.
W73-10054

PROBLEMS OF SUBSURFACE FLOW INTO SEAS (PROBLEMA PODZEMNOGO STOKA V MORYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
B. I. Kudelin, I. S. Zektser, A. V. Meskheteli, and S. A. Brusilovskiy.
Sovetskaya Geologiya, No 1, p 72-80. January 1971. 48 ref.

Descriptors: *Subsurface flow, *Groundwater movement, *Oceans, Lakes, Analytical techniques, Estimating, Hydrogeology, Hydrology, Geophysics, Geochemistry.
Identifiers: *USSR.

Investigations of subsurface flow into oceans, seas, and lakes are important for solution of a number of hydrogeological and hydrological problems. The problems include (1) the role of subsurface flow in the hydrologic cycle; (2) the influence of subsurface flow on water, salt, temperature, and hydrobiological regimes of seas; and (3) the role of subsurface flow in the formation of mineral resources on the sea floor. Hydrogeological, hydrological, geophysical, and geochemical methods of investigation are examined for quantitative estimates of subsurface flow into seas and inland bodies of water. (Josefson-USGS)
W73-10055

PATTERNS OF GROUNDWATER DISCHARGE BY EVAPORATION AND QUANTITATIVE ESTIMATES OF THE FACTORS AFFECTING EVAPORATION AND CONVECTIVE HEAT EXCHANGE (ZAKONOMERNOSTI RASKHODA GRUNTOVYKH VOD NA ISPARENIYE I KOLICHESTVENNYY UCHET F AKTOROV, VLIYAYUSHCHIKH NA ISPARENIYE I KONVEKTIVNYY TEPLOOBMEN),
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 02D.
W73-10056

HORIZONTAL SOIL-WATER INTAKE THROUGH A THIN ZONE OF REDUCED PERMEABILITY,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 02G.
W73-10057

WATER-TABLE FLUCTUATION IN SEMIPERVIOUS STREAM-UNCONFINED AQUIFER SYSTEMS,
California Univ., Davis.
M. A. Marino.
Journal of Hydrology, Vol 19, No 1, p 43-52, May 1973. 4 fig, 7 ref.

Descriptors: *Surface-groundwater relationships, *Water level fluctuations, Recharge, Infiltration, Alluvial channels, Permeability, Drawdown, Equations.

Available expressions which describe the water-table fluctuation in a stream-aquifer system are based primarily on the assumption that the bed of the stream is as permeable as the aquifer it completely cuts through. New analytical expressions were developed, in terms of the head averaged over the depth of saturation, to take into account the semiperviousness of the streambed. The situations considered the finite and semi-infinite aquifer systems in which the water level in the semipervious stream is suddenly lowered below its initial elevation, and suddenly raised above its initial elevation, and maintained constant thereafter. As a by-product, solutions are also obtained for finite and semi-finite aquifer systems in which the bed of the stream is as permeable as the aquifer. (Knapp-USGS)
W73-10058

INTERSTITIAL WATER CHEMISTRY AND AQUIFER PROPERTIES IN THE UPPER AND MIDDLE CHALK OF BERKSHIRE, ENGLAND,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 02K.
W73-10060

METHOD OF EVALUATING WATER BALANCE IN SITU ON THE BASIS OF WATER CONTENT MEASUREMENTS AND SUCTION EFFECTS (METHODE D'EVALUATION DU BILAN HYDRIQUE IN SITU A PARTIR DE LA MESURE DES TENEURS EN EAU ET DES SUCCIONS),
Grenoble Univ. (France).
For primary bibliographic entry see Field 02A.
W73-10197

TEST-OBSERVATION WELL NEAR PATERSON, WASHINGTON: DESCRIPTION AND PRELIMINARY RESULTS,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 04B.
W73-10322

GROUND WATER IN COASTAL GEORGIA,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 04B.
W73-10326

AQUIFER SIMULATION MODEL FOR USE ON DISK SUPPORTED SMALL COMPUTER SYSTEMS,
Illinois State Water Survey, Urbana.
T. A. Prickett, and C. G. Lonnquist.
Illinois State Water Survey Circular 114, 1973. 21 p, 15 fig, 6 ref.

Descriptors: *Groundwater movement, *Aquifer characteristics, *Simulation analysis, *Computer models, *Hydrogeology, Computer programs, Systems analysis, Input-output analysis, Mathematical studies, Equations, Water wells, Pumping, Groundwater recharge, Evapotranspiration, Digital computers, Forecasting.

A generalized digital computer program listing is given that can simulate two-dimensional flow of groundwater in heterogeneous aquifers under nonleaky and/or leaky artesian conditions. A special feature of the program is that a large simulation (up to an estimated 10,000 node problem) can be accomplished on a disk supported small computer with only 4,000 words (32 bits per word) of core storage. The computer program can handle time varying pumpage from wells, natural or artificial recharge rates, the ralationships of water exchange between surface waters and the groundwater reservoir, the process of groundwater evapotranspiration, and the mechanism of flow from springs. A finite difference approach is used to formulate the equations of groundwater flow. A modified alternating direction implicit method is used to solve the set of resulting difference equations. The discussion of the digital technique includes the necessary mathematical background, the documented program listing, sample computer input data, and explanations of job setup procedures. The program is written in FORTRAN and will operate with any consistent set of units. (Woodard-USGS)
W73-10328

EFFICIENCY OF PARTIALLY PENETRATING WELLS,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04B.
W73-10336

2G. Water in Soils

THE INFLUENCE OF NITROGEN LEACHING DURING WINTER ON THE NITROGEN SUPPLY FOR CEREALS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Pflanzenbau und Pflanzenzuechtung.
For primary bibliographic entry see Field 03F.
W73-09874

CRITERIA OF DETERMINATION OF INDUSTRIAL LANDS, (IN POLISH),
For primary bibliographic entry see Field 04C.
W73-09947

CONCEPTUAL MODELS FOR EVALUATION OF THE SUBTERRANEAN WATER CYCLE IN PALEOZOIC HIGHLANDS,
Bonn Univ. (West Germany). Institut fuer Geologie.
For primary bibliographic entry see Field 02F.
W73-09956

REACTIONS OF THE MONOCALCIUM PHOSPHATE MONOHYDRATE AND ANHYDROUS DIACALCIUM PHOSPHATE OF VOLCANIC SOILS, (IN SPANISH),
Chile Univ., Santiago.
J. Urrutia, and K. Igue.
Turrialba. Vol 22, No 2, p 144-149. 1972. Illus. English summary.
Identifiers: Allophane, Anhydrous compounds, Calcium, *Fertilizers, *Hydrates, Liming, *Phosphates, Soils, *Volcanic soils.

Reactions of monocalcium phosphate monohydrate (MCPM), ordinary superphosphate (MCP-S), and dicalcium phosphate anhydrous (DCPA) were studied in 3 highly P fixing volcanic soils. Soil columns were used to reproduce the micorenvironment around the fertilizer zone. The movement and reaction products of fertilizers in different soil layers in the column were determined. MCPM and MCP-S dissolved better than DCPA. Most of the P was retained in the upper layer. P movement through the column was inversely related to allophane content. The ratio of Al-P/F3-P decreased with increasing distance from the site of application. Liming allophanic soil up to 16 tons/ha did not show a marked increase in Ca-P. There was no marked effect of fertilizer upon occluded and reductant soluble forms of P under the experimental conditions.--Copyright 1973, Biological Abstracts, Inc.
W73-09982

ON THE HYDROPHOBIZATION OF A SOIL LAYER WITH THE VIEW OF INTERRUPTING CAPILLARY WATER MOVEMENT, (IN GERMAN),
Dsutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Muencheberg (East Germany). Forschungszentrum Bodenfruchtbarkeit.
For primary bibliographic entry see Field 02D.
W73-09984

MODES OF ACTION AND METHODS OF APPLICATION OF SOIL CONDITIONERS FOR IMPROVING PHYSICAL PROPERTIES OF THE SOIL, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Muenchberg (East Germany). Forschungszentrum Bodenfruchtbarkeit.
J. Lehfeldt, A. Kullman, K. Steinbrenner, D. Kleinhempel, and H. Lindner.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 4/5, p 281-300. 1972. English summary.
Identifiers: Evapotranspiration, Hydrophobing, *Soil physical properties, *Soil conditioners, Temperature, Transpiration.

The mode of action and the application of different soil conditioners primarily for improving the physical properties of the soil are described on the basis of recent literature. For structure stabilization, linear polymers are particularly suitable, but dispersions of organic polymers and hydrophobing products have also been used. Evapotranspiration may best be reduced if the surface pores are sealed by a mulch cover. Organic dispersions, such as bituminous emulsion, are suitable. Total or partial sealing of the pores at the depth of 60 to 100 cm or the establishment of barriers may improve the water storage capacity of light soils. The water storage capacity of light soils is also improved by the application of soil conditioners, such as open-cell foam materials and gels. Soils rich in colloids are lossened by hydrophobic, decomposition-resistant and mechanically stable materials, such as polystyrene foam material. Surface-applied dyed soil conditioners (e.g. bituminous emulsion) reduce the short-wave reflex radiation and thus raise soil temperature at the depth of sowing. Finally, the low sorptive capacity of many soils may be raised by adding highly sorptive products.--Copyright 1973, Biological Abstracts, Inc.
W73-09985

ON THE EFFECT OF A BITUMINOUS MULCH COVER ON WATER INFILTRATION, AIR COMPOSITION AND CONDENSATION PROCESSES IN THE SOIL, (IN GERMAN),
Humboldt-Universitaet sur Berlin (East Germany). Institut fuer Bodenkunde und Pflanzenernaehrung.
W. Krueger, and H. Benkenstein.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 4/5, p 298-391. 1972. Illus. English summary.
Identifiers: Air composition, Bituminous mulch, Carbon, Condensation, *Infiltration, *Mulch cover, Oxides, Oxygen, Processes, Soil surfaces.

Infiltration was reduced by bituminous mulch covers if the bituminous emulsion was applied to a smooth soil surface. The rate of infiltration declined as the applied quantity went up. If a finely aggregated soil surface was stabilized with a bituminous mulch cover, the rate of infiltration was higher even at an input of 6 t/ha than on untreated soil. Results from sandy and loamy sand soils had the same trend. On a light loam sandy soil with an unvegetated, smooth surface application of 6 t bituminous emulsion/ha changed the CO2 and O2 contents of the soil air insignificantly as compared with the unmulched variant. Significant differences appeared only at an input of 12 t/ha. Results from a silty loam in Mitscherlich pots showed the same trend. On sunny days, the different temperature of mulched and untreated plots resulted in higher vapor pressure values under the mulch cover. During a period of 4 days diffusion from soil 50 cm in depth was less by about 1 l of water /m3 less in the mulched soil than in the untreated one.--Copyright 1973, Biological Abstracts, Inc.
W73-09987

RELATION OF PHYSICAL AND MINERALOGICAL PROPERTIES TO STREAMBANK STABILITY,
Agricultural Research Service, Chickasha, Okla.
For primary bibliographic entry see Field 02J.
W73-09993

STUDIES ON THE RECLAMATION OF ACID SWAMP SOILS,
Ministry of Agriculture and Lands, Kuala Lumpur (Malaysia). Div. of Agriculture.
K. Kanapathy.
Malays Agric J. Vol 48, No 2, p 33-46. 1971. Illus.
Identifiers: Crops, Drainage (Soils), Field tests, Laboratory tests, *Liming, Palm-M, *Soil reclamation, *Soils (Acid swamp).

Tests were carried out in the laboratory, green house and in 2 areas in the field. The results obtained show that drainage and liming could be effectively used to reclaim acid swamp soils as well as improve crops growing on them. The oil palm was a very tolerant crop to acidity.--Copyright 1972, Biological Abstracts, Inc.
W73-10017

HORIZONTAL SOIL-WATER INTAKE THROUGH A THIN ZONE OF REDUCED PERMEABILITY,
Purdue Univ., Lafayette, Ind.
L. R. Ahuja, and D. Swartzendruber.
Journal of Hydrology, Vol 19, No 1, p 71-89, May 1973. 8 fig, 29 ref.

Descriptors: *Infiltration, *Percolation, *Soil water movement, *Unsaturated flow, Saturated flow, Numerical analysis, Hydraulic conductivity, Wetting.
Identifiers: *Horizontal infiltration.

One-dimensional, horizontal soil-water absorption through a thin zone of constant nonzero hydraulic resistance was examined theoretically as well as a similarity reduction of the problem for early to intermediate times. The flow equations were transformed by introducing a dimensionless parameter which enables the solution for any value of thin-zone resistance to be obtained from the solution for a given known thin-zone resistance. At the inlet boundary between the thin zone and the soil column, the soil-water content increases with time to approach the saturated value. The cumulative absorption of water by the soil column increases more than proportionally with the square root of time for early and intermediate times, and approaches a square-root-or-time proportionality at large times. For both the soil-water content at the inlet boundary and the cumulative water absorption by the soil column, simple expressions arise from the similarity-reduction analysis, which is based on specific functional forms of the soil-water diffusivity and suction head. For early to intermediate times of flow, the similarity-reduction analysis describes adequately the calculated numerical-solution flow data for Yolo soil, as well as the measurements obtained experimentally on Salkum silty clay loam. (Knapp-USGS)
W73-10057

MAJOR SOILS IN THE UPPER VALLEY OF THE MANSO RIVER, RIO NEGRO, (IN GERMAN),
Universidad Nacional del Sur, Bahia Blanca (Argentina).
H. A. Laya.
Pev Invest Agropecu Ser 3 Clima Suelo. Vol 8, No 4, p 171-183, 1971. Illus. English summary.
Identifiers: Alluvial, *Argentina (Manso River), Ash deposits, Glacial deposits, Rio-Negro, Rivers, *Soil types, Valley, Volcanic.

The principal soil groups are described and their geographical distribution given. The soils were classified using the NORTH-COTE key, and also the Natural Classification and 7th Approximation. Brief meteorological, vegetational and geological data are included. Some geomorphological elements of this narrow glacial valley, which display exceptional characteristics, are explained in more detail. Without considering the lithosols and skeletal soils of the higher slopes and the summits of mountains, the main soils are as follows. Glacial deposits form non calcic lithosols with small distribution. Volcanic ash deposits of 'O' layer common on the lower valley slopes, are superimposed over rocky formations or glacial and fluvioglacial deposits. Those soils that are Ando-like. A thin recent volcanic ash layer is commonly present in the upper part of the soils. Alluvial deposits include higher terrace and levee: Alluvial regosolic hydromorphic soils; very frequent stoniness at different depths and lower terrace: Peat Bog soils, with more than 1 m of decomposed plant remains. These soils are covered by water most or all of the year. These are the dominant soils in the valley bottoms.--Copyright 1973, Biological Abstracts, Inc.
W73-10067

NITROGEN IN NATURE AND SOIL FERTILITY, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
E. N. Mishustin.
Izv Akad Nauk SSSR Ser Biol. 1. p 5-22, 1972. Illus. English summary.
Identifiers: *Soil fertility, Fertilizers, Fixation, *Nitrogen, Soils, Symbiosis.

Abiotic processes take place in the atmosphere causing the formation of oxidized and reduced N compounds. These substances due to sorption and via rain water penetrate into the soil. The general enrichment of the soil in N by means of these processes is rather low. The soil becomes slightly enriched in N through the activity of free-living N fixators. Symbiotic N fixation whose exploitation in agricultural practice yields substantial results appears to be far more effective. Mineral N fertilizers are best applied to soils whose fertility has reached its maximum due to utilization of biological processes. While considering the N balance of USSR soils an insufficient utilization of biological N is observed. Future possibilities of a more intense N assimilation leading to an increase of soil fertility are discussed.--Copyright 1973, Biological Abstracts, Inc.
W73-10068

TEXTURAL ASPECT OF SOIL POROSITY, (IN FRENCH),
Institut National de la Recherche Agronomique, Versailles (France).
C. J. Fies.
Ann Agron (Paris). Vol 22, No 6, p 655-685, 1971. English summary.
Identifiers: Illite, Kaolinite, Model studies, Montmorillonite, *Soil porosity, Soils, *Texture (Soils).

The relationship between the overall porosity of soils and their texture is undertaken on the soil fabric level from models consisting of clay and soil skeleton mixture. The latter are selected from loams, silts and sands in combination of different proportions of clay, a kaolinite, a montmorillonite and a mixture (extracted from soil) of those two, with illite. These mixtures are made according to a record whereby the samples obtained were massive and structureless. After measuring the overall porosities of the various samples, the data are compared with those computed by means of a theoretical structural model. This comparison

highlights the disturbance brought about in the arrangement of the skeletal particles on initiation of the clay phase. This physical effect suggested taking the apparent density of the argillaceous phase and the specific surface of the grain skeleton as a basis for an equivalent soil fabric model. In the latter, the available clay contributes both to coating the skeletal particles (chlamydate clay) and filling-in of the intergranular voids (intertextic clay). This arrangement was defined with dry samples but is applicable to water-saturated samples.' The parametric values, defining the skeletal arrangement (matrix porosity) and the percentage of clay in the intergranular voids was then derived from determination of the swelling of pure clay.--Copyright 1973, Biological Abstracts, Inc.
W73-10069

ATMOSPHERIC MOISTURE CONDENSATION IN SOILS, (IN RUSSIAN),
V. I. Tochilov.
Probl Osvoeniya Pustyn'. 3, p 10-16. 1972. Illus. English summary.
Identifiers: Atmospheric moisture, Condensation, Equations, Laplace equation, Moisture, Soils, Thomson equation.

From the Laplace and Thomson equations relative critical molecular mositure was obtained. Critical molecular moisture is lower than that of capillary air. When the values are equal, capillary condensation occurs on which thermal condensation is superimposed.--Copyright 1973, Biological Abstracts, Inc.
W73-10173

DIFFUSION IN COMPLEX SYSTEMS,
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 02K.
W73-10183

THE USE OF NUCLEAR TECHNIQUES IN SOIL, AGROCHEMICAL AND RECLAMATION STUDIES. (PRIMENENIE METODOV ATOMNOI TEKHNIKI V POCHVENNO-AGROKHIMICHESKIKH I MELIORATIVNIKH ISSLEDOVANIYAKH),
Moskovskaya Selskokhozyaistvennaya Adademiya (USSR).
V. V. Rachinskii.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec. 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 123-130. 71 ref.

Descriptors: *Reviews, *Soil water movement, *Soil-water-plant relationships, *Tracers, Carbon radioisotopes, Tritium, Soil bacteria, Soil investigations, Soil science, Podzols, Soil moisture, Cycling nutrients, Moisture uptake, Decomposing organic matter, Radioactivity techniques, Radioisotopes, Humic acids, Analytical techniques, Forest soils, Absorption, Ion exchange, Diffusion, Groundwater movement, Radioecology.

Work at the Timiryazevsk Academy in the use of radioactivity techniques is reviewed. Chromatographic equations predicted sorption of phosphates by soil columns, by non-ideal behavior was shown by Ca and Sr. Fe mobility was affected by the presence of organic compounds; phosphate mobility, only by organic compounds containing Fe or Al. The absorption capacity of podzolic soil was 0.2 mg sulfate/g. Humic acid formation from C14 labeled pine needles occurred with a 50-60 year half-time in field studies. Decomposition of C14 labeled amino acid incorporated 1-2% of the C14 into humic acid. The rate constant for decomposition of urea by urobacilli was 10/mega-second; the temperature dependence was described by the Arhenius equation. Quasi-diffusion coefficients of 0.001-0.01 sq cm/sec were measured at velocities where hydrodynamic factors play a role. Soil moisture was measured by neutron techniques. (See also W72-10679) (Bopp-ORNL)
W73-10187

MOVEMENT OF ZN65 INTO SOILS FROM SURFACE APPLICATION OF ZN SULPHATE IN COLUMNS,
Haile Sellassie I Univ., Alem Maya (Ethiopia). Coll. of Agriculture.
M. Abebe.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 507-515.

Descriptors: Agriculture, *Soil-water-plant relationships, *Radioecology, *Tracers, *Soil chemistry, Soil science, Cycling nutrients, Cation exchange, Tracers, Path of pollutants.

Precipitation of Zn sulfate in base-saturated soils required the application of a larger amount in order to reach a given depth than predicted from only the cation exchange capacity of the soil. Competition with displaced cations for exchangeable sites decreased Zn retained to a depth of 6 cm (with an application of 55 millequivalents to a column of orchard soil, 7.5 cm in diameter and 30 cm long). At greater depth Zn was occluded by precipitated Ca sulfate. Zn concentration was nearly uniform at 4-10 cm depth; than it dropped to very low values. (See also W72-10679) (Bopp-ORNL)
W73-10191

STUDY ON THE SENSITIVITY OF SOIL MOISTURE MEASUREMENTS USING RADIATION TECHNIQUES, NYLON RESISTANCE UNITS AND A PRECISE LYSIMETER SYSTEM,
Ghent Rijksuniversiteit (Belgium). Dept. of Agricultural Science.
M. de Boodt, H. Verplancke, and A. V. Laksmipathy.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 605-619. 7 fig, 4 tab, 8 ref.

Descriptors: *Soil moisture meters, *Radioactivity techniques, *Electrical resistance, *Lysimeters, Pervious soils, Sands, Loam, Analytical techniques.

Moisture was measured in-situ in loamy sand soils (1) by the change in weight of the soil in a lysimeter indicated by a pressure transducer, (2) by the electrical resistance of nylon blocks buried in the soil, and (3) by a neutron moisture meter. The neutron meter, which responded rapidly, was about 10-16% higher than the lysimeter (within the variation expected from soil inhomogeneity). The electrical resistance blocks agreed better with the lysimeter, but a 5-day period was required for equilibration. (See also W72-10679) (Bopp-ORNL)
W73-10194

MONITORING THE WATER UTILIZATION EFFICIENCY OF VARIOUS IRRIGATED AND NON-IRRIGATED CROPS, USING NEUTRON MOISTURE PROBES (CONTROLE DE L'UTILISATION ET DE L'EFFICIENCE DE L'EAU CHEZ DIVERSES CULTURES IRRIGUEES OU NON, AU MOYEN D'HUMIDIMETRES A NEUTRONS),
For primary bibliographic entry see Field 03F.
W73-10195

OPTIMISATION OF SAMPLING FOR DETERMINING WATER BALANCES IN LAND UNDER CROPS BY MEANS OF NEUTRON MOISTURE METERS (OPTIMISATION DE L'ECHANTILLONNAGE POUR DETERMINER LES BILANS HYDRIQUES SOUS CULTURE AU MOYEN DE L'HUMIDIMETRE A NEUTRONS),
Institut Technique des Cereales et Fourrages, Paris (France).
For primary bibliographic entry see Field 03F.
W73-10196

ESTIMATE OF WATER BALANCE IN AN EVERGREEN FOREST IN THE LOWER IVORY COAST (ESTIMATION DU BILAN HYDRIQUE DANS UNE FORET SEMPERVIRENTE DE BASSE COTE-D'IVOIRE),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre d'Adiopodoume.
For primary bibliographic entry see Field 02D.
W73-10198

GROUND MOISTURE MEASUREMENT IN AGRICULTURE (BODENFEUCHTEMESSUNG IN DER LANDWIRTSCHAFT),
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
For primary bibliographic entry see Field 03F.
W73-10209

STUDIES ON THE PERMEABILITY OF SOME TYPICAL SOIL PROFILES OF RAJASTHAN IN RELATION TO THEIR PORE SIZE DISTRIBUTION AND MECHANICAL COMPOSITION,
Udaipur Univ. (India). Coll. of Agriculture.
K. S. Singh, and G. Singh.
Annals of Arid Zone, Vol 10, No 2-3, p 105-110, 1972. 1 tab, 7 ref.

Descriptors: *Permeability, *Soil investigations, *Porosity, *Soil classification, *Soil texture, Infiltration, Percolation, Soil profiles, Distribution, Soil physical properties, Agriculture, Planning, Depth, Capillary fringe, Sampling, Soil structure.

Information about permeability is essential to the functional classification of the soil. It is needed for adequate planning of drainage and irrigation systems, and in planning flood control measures. Permeability, pore size distribution and mechanical composition of some profiles of Rajasthan were determined. The permeability of the soil profiles in general decreased downwards. The coefficient of permeability of Dungargarh soil was highest and of Kota was lowest at all depths. The capillary porosity and silt plus clay content of the soil samples were negatively correlated, whereas, non-capillary porosity, total pore space and sand content were positively correlated with the coefficient of permeability. Capillary porosity, silt plus clay percent, non-capillary porosity and sand percent had significant correlation with the permeability. The relationship between coefficient of permeability and percent total pore space was not significant. (Black-Arizona)
W73-10210

ROCK MULCH IS REDISCOVERED,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 03B.
W73-10212

MATHEMATICAL MODELING OF SOIL TEMPERATURE,
Arizona Univ., Tucson. Office of Arid-Lands Research.
K. E. Foster, and M. M. Fogel.
Progressive Agriculture in Arizona, Vol 25, No 1, p 10-12, Jan-Feb 1973. 2 fig, 2 ref.

Descriptors: *Soil temperature meters, *Mathematical models, *Soil temperature, *Microenvironment, *Energy budget, Canopy, Temperature, Correlation analysis, Heat budget, Arizona.

A data collection program was initiated in the summer of 1970 at the Santa Rita Experimental Range, in southern Arizona, to test a mathematical model developed to simulate soil surface temperature and subsurface temperature profiles to any desired depth on an hourly basis. While a surface energy budget for a bare soil can be written, the need for soil temperature simulation beneath a variable vegetation cover is desirable, so an equation was written to account for the energy partitioning between the plant canopy and the soil surface, resulting in an energy balance equation for both plant canopy and soil surface. Programming on a CDC 6400 computer produced calculations of hourly soil surface and subsurface temperature variation at 5 cm increments down to 70 cm, and model results were verified in the field by 2 Honeywell Tektronik 24-channel recorders, with a natural state control plot and a cleared plot. Observed and calculated temperatures agreed in most cases within 2 degrees F. During late mornings and early afternoons, vegetation intercepted at least 30 percent of the incoming solar radiation. This study successfully simulates a complex natural phenomenon occurring at the earth's surface. Soil temperature variation was the variable measured in the field which was a measure of the model's accuracy. The model also simulated hourly the latent heat flux, soil heat flux, and sensible heat flux. An additional use of the model could simulate energy budget response under varying plant canopies and initial soil conditions. (Paylore-Arizona)
W73-10213

RELATIVE LEACHING POTENTIALS ESTIMATED FROM HYDROLOGIC SOIL GROUPS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
C. B. England.
Water Resources Bulletin, Vol 9, No 3, p 590-597, June 1973. 2 fig, 2 tab, 7 ref.

Descriptors: *Leaching, *Soil water movement, *Soil groups, Recharge, Groundwater movement, Infiltration, Soil properties, Path of pollutants, Percolation.

Leaching of soils with water can be both beneficial and hazardous at the same time, by removing salts harmful to plants and contributing dissolved substances to groundwater. The leaching potential of a given soil is difficult to assess, even with complex instrumentation. The final infiltration rates associated with the Hydrologic Soil Groups used by the USDA Soil Conservation Service in watershed planning may provide a useful guide in estimating quantities of leaching water moving through soil profiles. (Knapp-USGS)
W73-10333

THE EFFECT OF TEMPERATURE AND MOISTURE ON MICROFLORA OF PEAT-BOGGY SOIL, (IN RUSSIAN),
For primary bibliographic entry see Field 02I.
W73-10381

FIELD TRIALS ON IMPROVEMENT OF SALINE SOIL IN THE SIBARI PLAIN, (IN ITALIAN),
Bari Univ. (Italy).
For primary bibliographic entry see Field 03C.
W73-10382

POLLUTION AND DEGRADATION OF SOILS: A SURVEY OF PROBLEMS,
State Coll. of Agronomical Science, Gembloux (Belgium).
For primary bibliographic entry see Field 05B.
W73-10384

2H. Lakes

STUDIES ON BENTHIC NEMATODE ECOLOGY IN A SMALL FRESHWATER POND,
Auburn Univ., Ala. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 05A.
W73-09751

NUTRIENT TRANSPORT BY SEDIMENT--WATER INTERACTION,
Illinois Univ., Chicago. Dept. of Materials Engineering.
For primary bibliographic entry see Field 05C.
W73-09754

CLADOPHORA AS RELATED TO POLLUTION AND EUTROPHICATION IN WESTERN LAKE ERIE,
Ohio State Univ., Columbus. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-09757

AIR INJECTION AT LAKE CACHUMA, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 05G.
W73-09799

LIMNOLOGY OF DELTA EXPANSES OF LAKE BAYKAL (LIMNOLOGIYA PRIDEL'TOVYKH PROSTRANSTV BAYKALA).

Akademiya Nauk SSSR Sibirskoye Otdeleniye, Limnologicheskiy Institut Trudy, No 12 (32), Galaziy, G. I., editor, Leningrad, 1971. 295 p.

Descriptors: *Limnology, *Lakes, *Deltas, *Aquatic life, Fish, Aquatic algae, Aquatic bacteria, Benthic fauna, Seston, Plankton, Biomass, Primary productivity, Benthos, Bottom sediments, Organic matter, Inorganic compounds, Metals, Mineralogy, Meteorology, Topography.
Identifiers: *USSR, *Lake Baykal, Oozes, Saprophytes, Infusoria.

This collection contains 22 papers devoted to recent investigations by the Baykal Limnological Institute in shallow waters of Lake Baykal. The papers are grouped under four subject headings: hydrometeorological elements (3 papers); bottom topography and chemical composition of bottom sediments (5 papers); benthos and food sources for benthos-feeding fish (5 papers); and plankton and food sources for plankton-feeding fish (9 papers). (Josefson-USGS)
W73-09806

PRESENT AND FUTURE WATER AND SALT BALANCES OF SOUTHERN SEAS IN THE USSR (SOVREMENNYY I PERSPEKTIVNYY VODNYY I SOLEVOY BALANS YUZHNYKH MOREY SSSR).
State Oceanographic Inst., Moscow (USSR).

Gosudarstvennyy Okenograficheskiy Institut Trudy, No 108, Simonov, A. I., and Goptarev, N. P., editors, Moscow, 1972. 236 p.

Descriptors: *Lakes, *Water balance, *Salt balance, *Water properties, Salinity, Water temperature, Ice, Water levels, Water chemistry, Hydrology, Hydrologic cycle, Inflow, Discharge (Water), Runoff, Precipitation (Atmospheric), Evaporation, Currents (Water), Bottom sediments, Diversion, Regulation.
Identifiers: *USSR, *Sea of Azov, *Caspian Sea, *Aral Sea, Nomograms.

Computations of present and future hydrologic and hydrochemical regimes of the Azov, Caspian, and Aral Seas were based on investigations carried out by the State Oceanographic Institute in 1966-70. Scientifically sound proposals are suggested for maintaining and developing the natural resources of these southern seas. For the Sea of Azov, these include regulation of water and salt balances in the Kerch Strait for optimal salinity and water levels without costly diversions of freshwater from other river basins; for the Caspian Sea, diversion of part (20-25 cu km/yr) of the surplus flow of northern rivers into the Volga-Kama basin, regulation of flow of Caspian waters into Kara-Bogaz-Gol at 5 cu km annually, and reduction of evaporation by separation of the shallow northeastern part of the sea by an earthen dike; and for the Aral Sea, irrigation and flooding of lands of Soviet Central Asia and Kazakhstan, and maintenance of the sea level by diversion of part of the discharge of the Ob' and Yenisey. (Josefson-USGS)
W73-09807

ROLE OF SUBSURFACE FLOW IN THE FORMATION OF THE SALT COMPOSITION OF THE CASPIAN SEA (O ROLI PODZEMNOGO STOKA V FORMIROVANII SOLEVOGO SOSTAVA KASPIYSKOGO MORYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 02F.
W73-09808

RATIO OF ORGANIC AND MINERAL COMPONENTS OF THE SOUTH BAIKAL SUSPENDED WATERS (IN RUSSIAN),
For primary bibliographic entry see Field 05B.
W73-09812

VERTICAL DISTRIBUTION AND ABUNDANCE OF THE MACRO- AND MEIOFAUNA IN THE PROFUNDAL SEDIMENTS OF LAKE PAIJANNE, FINLAND,
Jyvaskyla Univ. (Finland). Dept. of Biology.
J. Sarkka, and L. Paasivirta.
Ann Zool Fenn. Vol 9, No 1, p 1-9. 1972. Illus.
Identifiers: Chaoborus-flavicans, *Fauna, *Finland, Lakes, *Lake Paijanne, Peloscolex-ferox, Pisidium-conventus, Primary productivity, *Profundal, Sediments, Tubifex-tubifex, Vertical distribution, Lake sediments.

In the bottom sediments of the profundal of Lake Paeijaenne the maximum of all species or groups of the macro- and meiofauna at depths below 30 m seems to be near the surface of the sediment. On an average 58.4% of the macrofauna was in the 2 uppermost and 86.7% in the 6 uppermost cm. For the meiofauna the corresponding figures were 78.3 and 99.1%. In the more polluted areas the macrofauna lives deeper in the sediment than in the cleaner parts of the lake. It is suggested that here the redox potential is less favorable near the surface of the sediment than in the deeper layers. Differences in numbers of individuals of the bottom macrofauna and meiofauna in different parts of the lake are discussed, as well as the relations between the numbers of bottom fauna and the primary productivity. In the most polluted northern part of the lake dominant forms of the macrofauna are Tubifex tubifex and Chaoborus flavicans, in the clean southern part Pisidium conventus, Peloscolex ferox, Tanytarsini, Tanypodinae, Lumbriculidae, and T. tubilex. In the northern part the dominant forms of the meiofauna are Cyclopoida, in the southern part Nematoda, Cyclopoida and Harpacticoida.--Copyright 1972, Biological Abstracts, Inc.
W73-09818

MODELLING PROCESSES FOR STUDY AND EXPLORATION OF LAKE ECOLOGICAL SYSTEM (IN RUSSIAN),
Akademiya Nauk SSSR, Leningrad. Institut Evolyutsionnoi Fiziologii i Biokhimii.

V. V. Menshutkin.
Zh Obshch Biol. Vol 33, No 1, p 15-20. 1972. Illus. English summary.
Identifiers: *Ecological studies, Exploration, Lakes, Mathematical methods, Model studies, Ecosystem.

Investigation and exploration of the natural resources of a lake ecological system are examined by mathematical methods. Two types of information on the ecosystem are distinguished: theoretical and operative. For high effectiveness on the use of natural resources of a lake ecosystem, greater expenditure is required in obtaining theoretical information than on direct observations on the ecosystem condition.--Copyright 1972, Biological Abstracts, Inc.
W73-09821

A NOTE ON LAKE CHILWA CYCLIC CHANGES,
Chancellor Coll., Limbe (Malawi).
W. Chipeta.
J Interdiscip Cycle Res. Vol 3, No 1, p 87-90, 1972. Illus.
Identifiers: *Lake Chilwa, Cyclic change, Lakes, *Malawi-Mozambique, Rainfall, Seasonal changes, Lake evaporation, Water levels.

The effect of rainfall, seasonal changes and lake evaporation on lake water level fluctuations in Lake Chilwa, Malawi-Mozambique, is discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-09844

SURFACE HEAT TRANSFER FROM A HOT SPRING FED LAKE,
Stanford Univ., Calif. Dept. of Civil Engineering.
A. W. Miller, Jr., and R. L. Street.
Technical Report No 160, August 1972. 95 p, 23 fig, 2 tab, 15 ref, 3 append.

Descriptors: *Lake bottom springs, *Energy budget, *Heat transfer, *Air-water interfaces, *Model studies, Lakes, Hot springs, Heat balance, Surface waters, Data collection, Instrumentation, Measurements, Theoretical analysis, Mathematical models, Diffusion, Forecasting, Meteorology, *Wyoming.
Identifiers: *Terrace Spring (Wyo).

Analyses are described of surface heat exchange using field data acquired during the summer of 1971 at Terrace Spring in Yellowstone National Park, Wyoming. Derivations for the theory of heat exchange are reviewed and the procedure by which the theory is utilized is described. The role and effect of wind in heat exchange are discussed. A descriptive characterization of the field site with accompanying tables and figures is included, as well as the data identification, equipment, collection procedure, and measurement accuracy. Data evaluation methods for observed and predicted parameters are described comprehensively. Finally, the results of these evaluations are numerically and graphically presented. Findings from the study confirm that appreciable heat is dissipated to the atmosphere at low windspeeds, that equilibrium temperature may be estimated accurately simply by adding to the dewpoint temperature the quotient of gross solar radiation over the exchange coefficient, and that water surface temperature may be predicted by employing an expression which involves only the measured windspeed, gross solar radiation, and dewpoint temperature. The study establishes that the theory given by Brady, Graves, and Geyer is applicable within a framework of specific qualifications. (Jerome-Vanderbilt)
W73-09847

A PHYSICOCHEMICAL STUDY OF THE WATER OF SMALL AND LARGE PONDS AND ITS EFFECT ON PISCICULTURE, (IN RUMAINIA),
Institutul Agronomic Dr. Petru Groza, Cluj (Rumania).
L. Egri, and C. Man.
Inst Agron Dr. Petru Groza Cluj Lucr Stiint Ser Zooteh. 26. p 253-260. 1970. English summary.
Identifiers: Fish, Minerals, Oxygen, Physicochemical studies, *Pisciculture, Ponds, *Romania, Water chemistry, *Dissolved oxygen.

Physicochemical analyses of some Romanian pond waters were periodically made with special regard to the elements of fishery importance e.g. color, turbidity, temperature, alkalinity, Ca, Mn, chlorides, sulfates, H2S, Fe, ammonia, nitrates, nitrities, dissolved O2 and water oxidability. It was concluded that the pond waters furnish favorable ecological conditions for profitable fish production.--Copyright 1972, Biological Abstracts, Inc.
W73-09882

GROUNDWATER FLOW SYSTEMS, PAST AND PRESENT,
Department of the Environment (Alberta). Inland Waters Branch.
For primary bibliographic entry see Field 02F.
W73-09965

FORMATION AND DIAGENESIS OF INORGANIC CA MG CARBONATES IN THE LACUSTRINE ENVIRONMENT,
Heidelberg Univ. (West Germany). Sediment Research Lab.
G. Mueller, G. Irion, and U. Foerstner.
Naturwissneschaften, Vol 59, No 4, p 158-164, 1972, Illus.
Identifiers: Calcium, *Carbonates, *Diagenesis, Environment, *Lacustrine formation, *Magnesium, Lakes, Minerals (Inorganic).

Lacustrine formation of primary carbonate minerals (calcite, high-Mg calcite, aragonite, hydrous Mg carbonates) and of secondary carbonates (dolomite, huntite and magnesite), as determined from 25 lakes with differing hydrochemistry and salinity, is dependent on the Mg/Ca ratio of the lake or pore water, respectively. Secondary carbonates are found only in lake sediments with high-Mg calcite and a Mg/Ca ratio of more than 7. The only difference between nonmarine (including speleothems) and marine carbonates is the absence of calcite in the marine environment.--Copyright 1972, Biological Abstracts, Inc.
W73-10003

THE PATHWAYS OF PHOSPHORUS IN LAKE WATER,
Wyzsza Szkola Rolnicza, Wroclaw (Poland).
For primary bibliographic entry see Field 05B.
W73-10004

INVESTIGATIONS ON CRUSTACEAN AND MOLLUSCAN REMAINS IN THE UPPER SEDIMENTARY LAYER OF LAKE BALATON,
Magyar Tudomanyos Akademia, Tihany. Biological Research Inst.
J. E. Ponyi.
Ann Inst Biol (Tihany) Hung Acad Sci. 38, p 183-197, 1971, Illus, Maps.
Identifiers: *Lake Balaton (Hungary), Bosmina-longirostris, *Candona, *Crustacea, Darwinula, Dreissena, Lakes, *Molluscan remains, Sediments, Siltation.

The frequency and relative amounts of Mollusca and Ostracoda shells rapidly increased northward especially between the depth axis of the lake and the northern shore. The relative amount of Cladocera fragments is lower in the cores of the Keszthely-Bay than in the other investigated sections. The ratio of Candona and Darwinula shells compared to each other seems to be connected with the amount of detritus. The decrease of the latter causes a change in the ratio in favor of Candona while an increase brings an opposite effect. The population of Bosmina longirostris might have been significant in the southwestern basin of Lake Balaton during the last 70-90 yr. On the basis of occurrence of Dreissena shells in depth, the average siltation of Lake Balaton can be estimated as 1.7 mm/yr. The siltation seems to be most intense in the central regions of the lake.--Copyright 1972, Biological Abstracts, Inc.
W73-10005

BLUE-GREEN ALGAE FROM THE KREMENCHUG RESERVOIR AS A BASE FOR GROWING MICROORGANISMS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Microbiology and Virology.
For primary bibliographic entry see Field 05C.
W73-10013

GEOGRAPHY OF LAKES IN THE BOL'SHEZEMEL'SKAYA TUNDRA (GEOGRAFIYA OZER BOL'SHEZEMEL'SKOY TUNDRY),
L. P. Goldina.
Izdatel'stvo 'Nauka', Leningrad, 1972. 103 p.

Descriptors: Lakes, *Lake morphology, *Lake morphometry, *Lake basins, *Tundra, Lake sediments, Lake ice, Lake fisheries, Meteorology, Geology, Geomorphology, Hydrology, Water chemistry, Physicochemical properties, Water balance, Water levels, Temperature, Bathymetry, Mapping, Curves.
Identifiers: *USSR, *Geography, Lake classification.

Physiographic, hydrologic, and hydrochemical characteristics of lakes were investigated in 1962-63 in the eastern part of the Bol'shezemel'skaya tundra in northeastern European Russia. The number of lakes in the region, which exceeds 1,500 sq km, is more than 6,000. The importance of the lakes to the national economy of the Komi Republic is discussed, and a system of lake classification is proposed, based on morphometric parameters, thermal properties, origin of lake basins, physicochemical characteristics, and certain biological indices. (Josefson-USGS)
W73-10047

TRACER RELATIONS IN MIXED LAKES IN NON-STEADY STATE,
Weizmann Inst. of Science, Rehovot (Israel). Isotope Dept.
A. Nir.
Journal of Hydrology, Vol 19, No 1, p 33-41, May 1973. 6 ref.

Descriptors: *Tracers, *Tracking techniques, *Mixing, *Lakes, *Limnology, Water chemistry, Evaporation, Radioisotopes, Stable isotopes, Thermal stratification.

In limnological applications of tracer data, the concentration of a tracer in a completely mixed reservoir is studied when the concentration of the tracer in the inflow is a varying function of time. Tracer concentration in mixed lakes is usually calculated under assumption of steady hydrologic state with constant input, output, and volume. Departures from steady state are treated by the use of average flow or weighting the concentration by inflow values. An exact analytical solution indicates the limits of validity of the approximations. The exact solution can be adapted for multiple inputs and outputs, exchange with atmospheric moisture, evaporation with isotope fractionation and formation of epilimnion. The solution is simplified for certain types of connection between outflow and volume. (Knapp-USGS)
W73-10059

RETENTION LAKES OF LARGE DAMS IN HOT TROPICAL REGIONS, THEIR INFLUENCE ON ENDEMIC PARASITIC DISEASES,
For primary bibliographic entry see Field 05C.
W73-10070

DEPENDENCE OF PRODUCTION OF BACTERIA ON THEIR ABUNDANCE IN LAKE WATER,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
For primary bibliographic entry see Field 05C.
W73-10082

THE UTILIZATION OF BOGS IN CZECHOSLOVAKIA,
For primary bibliographic entry see Field 04A.
W73-10131

DETERMINATION OF THE YIELD BY LIQUID SCINTILLATION OF THE 14C IN THE MEASUREMENT OF PRIMARY PRODUCTION IN A LAGOON ENVIRONMENT, (DETERMINATION DES RENDEMENTS DU COMPTAGE PAR SCINTILLATION LIQUIDE DU 14C DANS LES MESURES DE PRODUCTION PRIMAIRE EN MILIEU LAGUNAIRE).
For primary bibliographic entry see Field 05C.
W73-10137

ENRICHMENT EXPERIMENTS IN THE RIVERIS RESERVOIR,
Bonn Univ. (Germany). Zoological Inst.
For primary bibliographic entry see Field 05C.
W73-10157

GLOEOTRICHIA PISUM THURET IN LAKE TRASIMENO, (IN ITALIAN),
Perugia Univ. (Italy). Istituto di Botanica Generale.
B. Granetti.
Riv Idrobiol. Vol 8 No 1/2, p 3-15. 1969. Illus. (English summary).
Identifiers: *Gloeotrichia-Pisum, *Italy, Lakes, *Lake Trasimeno.

A vast G. pisum station which seems to have found excellent growth conditions in Lake Trasimeno was recorded. The physical and chemical characteristics of the water from a summer analysis are mentioned. The alga and its annual growth cycle are described.--Copyright 1973, Biological Abstracts, Inc.
W73-10166

RESERVOIR RELEASE RESEARCH PROJECT.
For primary bibliographic entry see Field 05G.
W73-10261

CONTRIBUTION CONCERNING THE AQUATIC AND PALUSTRAL VEGETATION OF DUDU SWAMP AND LAKE MOGOSOAIA, (IN RUMANIAN),
Bucharest Univ. (Rumania).
G. A. Nedelcu.
An Univ Bucur Biol Veg. 18, p 235-255, 1969.
Identifiers: Aquatic vegetation, Carex, Dudu swamp, Elodea, Hydrocharis, Lakes, Lemna, *Lake Mogosoaia, Myriophyllum, Palustral vegetation, Phragmites, Potamogeton, *Romania, Salvinia, Scirpus, *Swamps, Typha, *Vegetation.

In a study on the aquatic and palustral vegetation of 2 aquatic basins of the Romanian plain, Dudu Swamp and Lake Mogosoaia, 17 associations were discussed. Some such as Lemno-Salvinietum natantis, Potametum lucentis, Typhetum angustifoliae, Caricetum riparioacutiformis are common for the 2 basins. Hydrocharitetum morsus-ranae, Myriophyllo-Potametum, Typhetum laxmanii grow at Dudu, while Riccietum fluitantis, Elodeetum canadensis, Phragmitetum natantis, grow at Mogosoaia. The subassociation Typhosum laxmannii Ubrizsy, 1961, was elevated to the rank of an association. Its ecology differs from that of the Scirpo-Phragmitetum association and it has its own characteristic species. The species characteristic of the Phragmitetum natantis, Borza, 1960 association were described for the first time.--Copyright 1973, Biological Abstracts, Inc.
W73-10353

A METHOD OF CONCENTRATING TRACES OF HEAVY METAL IONS FROM LAKE WATERS,
Wyzsza Szkola Rolnicza, Olsztyn-Kortowa (Poland).
F. Wieclawski.
Acta Hydrobiol. Vol 14, No 1, p 57-66, 1972. Illus.
Identifiers: *Heavy metals, *Ions, Lakes, *Trace elements, Water analysis.

The usefulness of the dithizone column for separating and initially concentrating traces of heavy metal ions (Pb, Cd, Zn, Mn, Cu, and Co) from lake waters was tested. The fully described methods applied include the collection of water samples, the preparation of the dithizone extraction column, and the determination of trace heavy metals by the polarographic method. The periodically great biological production of lake waters and the variable O2 conditions prevailing in them make it difficult to make full use of all the advantages of the tested method.--Copyright 1972, Biological Abstracts, Inc
W73-10373

WATER MICROFLORA OF KAPCHAGAJ RESERVOIR DURING THE FRIST YEAR OF ITS FILLING, (IN RUSSIAN),
Akademiya Nauk Kazakhskoi SSR, Alma-Ata. Inst. of Microbiology and Virology.
N. K. Gulaya, and N. L. Tyuten'kova.
Mikrobiologiya. Vol 41, No 2, p 349-355, 1972. English summary.
Identifiers: *Bacteria, Flora, Fungi, *Kapchagaj Reservoir, *Microflora, Photosynthesis, Reservoirs, USSR, Year, Yeast.

The first microflora determination of the Kapchagaj reservoir was performed in July, 1970. The total bacterial number was the highest in waters of the shoal at the leftbank flood-lands of the river, and the lowest in the open part of the reservoir. The bacterial number correlated with the amount of photosynthesis. The determination of the rate of water self-purification showed that 48-62% of easily oxidized organic matter was decomposed each day in shallow waters and only 5-12% in the open part of the reservoir. Numerous sulfate-reducing, thionic, cellulose-decomposing bacteria, yeasts and fungi were also detected.--Copyright 1972, Biological Abstracts, Inc.
W73-10375

POPULATIONS OF CLADOCERA AND COPEPODA IN DAM RESERVOIRS OF SOUTHERN POLAND,
Jagellonian Univ., Krakow (Poland). Dept. of Hydrobiology.
K. Starzykowa.
Acta Hydrobiol. Vol 14, No 1, p 37-55, 1972. Illus.
Identifiers: *Cladocera, *Copepoda, Dams, Plankton, *Poland, Reservoirs, *Rotatoria, Southern, Zooplankton.

Populations of planktonic crustaceans were investigated in 10 dam reservoirs on rivers lying in the Vistula basin and 90 spp. were found (37 Rotatoria, 32 Cladocera, and 21 Copepoda). The most varied crustacean plankton occurred in water steps, where the diversity index was 23-25. The most uniform was in the lowland reservoir at Kozlowa Gora and in Boznow. The magnitude of zooplankton production depended on the rate of water exchange and on the age of the reservoir. Three types of curves of the development of populations in the course of the season were distinguished. In the majority of reservoirs seasonal maxima were simultaneously attained by 2 populations. In Cladocera populations mature individuals prevailed.--Copyright 1972, Biological Abstracts, Inc.
W73-10376

PATTERN AND PROCESS IN DUNE SLACK VEGETATION ALONG AN EXCAVATED LAKE IN THE KENNEMER DUNES, (IN DUTCH),
G. Londo.
Verh Rijksinst Natuurbeheer. 2. p 9-279. 1971. Illus. English summary.
Identifiers: Biomass, Calamagrostis-epigejos, Carex-flacca, *Dunes, Eleocharis-palustris-spp-palustris, Elodea-spp, Excavated, Hippophae, Infiltration, Juncus-spp, Kennemer, Lakes, Lime, Lycopus-europaeus, Mentha-aquatica, Morphology, Mosses, *Netherlands, Nitrogen, Phosphorus, Phragmites-communis, Salix-repens, Seepage, *Vegetation (Dune slack).

General features of the specific dune environment are discussed, followed by discussion of several external and internal habitat factors regarding the lake and its shores. The lake is in the most calcareous Dutch dune area where Hippophae scrubs and Calamagrostis epigejos grasslands dominate. The lake is on a slope of the phreatic surface; consequently, on the western and northern shore, seepage, and on the eastern and southern shores, infiltration, occur. Besides a high lime content (4-9%), a relatively high amount of N and P is found, probably from bird excrement. They hygrosere is discussed as an ecosystem where many factors interact. The investigation involved successive vegetation mapping (in 1956, 1963 and 1968), detailed mapping of species populations, and analysis of permanent quadrats. The methods are discussed. Succession is discussed in each of the hygrosere zones. In the aquatic community, Chara communities were first replaced by Elodea canadensis and E. nuttallii, but then regained dominance. A succession from Juncus articulatus and Juncus bufonius to Eleocharis palustris ssp. palustris, then to Phragmites communis, is described for the lowest shore zone. In the higher part of the hygrosere zonation, a Salix repens vegetation prevails with the mosses Drepanocladus aduncus and Calliergonella cuspidata developing in the latter part of the study. The mesosere Galio-Koelerion-Hippophae vegetation and the transitional mesosere-hygrosere community are discussed. In the latter, Carex flacca was the original dominant, but due to flooding with nutrient-rich water, tall forb thickets comprising C. epigejos, Lycopus europaeus, and Mentha aquatica developed. With time, sharp borders among community types deteriorated, leaving more gradual transitions. A negative correlation between biomass and species diversity was shown. Floristic inventories are summarized in a differentiated list of all vascular plant species observed in the period 1956-1968 along and in the Grote Vogelmeer. Details are given for each species. The vegetation development along the Grote Vogelmeer runs roughly parallel with that along and in other excavated lakes and slacks in the caleareous dunes; it deviates in various aspects from the succession as described for the Wadden district (dunes poor in lime). The reasons no Junco-Schoenetum development along the Grote Vogelmeer are discussed. Guidelines for creation and management of habitats for dune slack vegetation are outlined.--Copyright 1973, Biological Abstracts, Inc.
W73-10392

CONTRIBUTIONS TO THE KNOWLEDGE OF THE ALGAE OF THE ALKALINE ('SZIK') WATERS OF HUNGARY. III. THE

PHYTOSESTON OF THE ALKALINE PONDS NEAR KUNFEHERTO,
Damjanich Muzeum, Szolnok (Hungary). Laboratorium Tisza-Forsch.
G. Uherkovich.
Acta Bot Acad Sci Hung. Vol 16, No 3/4, p 405-426. 1970. Illus. English summary.
Identifiers: *Algae, *Alkaline ponds, Alkalinity, *Phytoseston, Butryococcus-braunii, Carbonates, Dactylococcopis-rupestris, Gomphosphaeria-aponina, *Hungary (Kunfeherto), Phormidium-fragile, Ponds, Salinity, Scenedesmus, Szik.

A survey was made of the phytoseston of 2 alkaline ('szik') ponds situated in a deflational depression near the village Kunfeherto, 9 km SW from Kiskunhalas, between the Danube and Tisza rivers. Qualitative examinations revealed the presence of 186 taxa: 38 taxa euryhaline-limnic species, 8 brackish water species, and 9 taxa transitional between the 2 ecosystems. The quantitative analysis of the phytoseston of Feherto (White Pond) showed a greater NaHCO3 content and higher alkalinity; total individuals/1. fluctuated between 8000 and 39,150,000. A Dactylococcopsis repeatris-Phormidium fragile-Botryococcus braunii cenosis prevails. In the so-called Kisto (Little Pond) of minor NaHCO3 content, the values of total individuals/1. fluctuated only between 165,000 and 7,110,000. Here, on average, a Gomphosphaeria aponina-Botrycoccus braunii-Scenedesmus cenosis is present. The term 'salinity' is discussed.--Copyright 1973, Biological Abstracts, Inc.
W73-10397

VEGETATION OF THE RESERVE 'PEAT BOG AT CZARNE SOSNOWICKIE LAKE', (IN POLISH),
Marie Curie-Sklodowska Univ., Lublin (Poland). Nauk Ziemi.
D. Fijalkowski, and K. Kozak.
Ann Univ Mariae Curie Curie-Sklodowska Sec C Biol. 25, p 213-214. 1970. Illus. Map.
Identifiers: Aldrovanda-vesiculos, Batrachium-circinatum, Bogs, Czarne-sosnowickie, Drosera-spp, Forest, Gyttja, Hydrocotyle-vulgaris, Isotes-Lacustris, Isolepis-setacea, Juncus-squarrosus, Lakes, Litorella-Uniflora, Myriophyllum-alterniflorum, Nymphaea-candida, Petasites-spurinus, Pine, Reserve, Silene-lithuanica, Utricularia-spp, *Vegetation, *Poland, *Peat bog.

The reserve 'Peat Bog at Czarne Sosnowickie Lake' comprises a shallow (to 5 m deep) hollow filled with peat and gyttja. The maximum thickness of peat layer amounts to 2 m and of gyttja to 3 m. The gyttja occurs mainly in the western part of peat bog and points to the presence, for a long period, of a reservoir linked now with the Czarne Sosnowickie lake. Within the reserve on the bottom of hollow there were distinguished 3 plant associations: Caricetum lasiocarpae, Eriophoro-sphagnetum and Sphagnetum medio-rubelli. In afforested places, the margins of hollow are covered with the fragments of: Junco-Motinietum, Epilobio-Juncetum, Carici-Agrostietum, Nardo-Juncetum, and Nardtum strictae, and non-afforested cover comprises Salici-Franguletum. Carici elongatae-Alnetum, and Vaccinio uliginosi-Pinetum. Sandy slopes encircling the hollow of peat bog are grown with the pine forests: Vaccinio myrtilli-Pinetum, Cladonio-Pinetum, and Corynephoretum. The Czarne Sosnowickie lake adhering to the reserve has some very interesting aquatic communities: Ceratophylletum demersi, Myriophylletum alterniflori, Myriophyllo-Nupharetum, and Scirpo-Phragmitetum, and also the littoral Ranunculo-Juncetum bulbosi and Caricetum rostratae. In the reserve and its surroundings occur the rare plant species Myriophyllum alterniflorum and Hydrocotyle vulgaris (numerous) Juncus squarrosus, Drosera rotundifolia, and Batrachium circinatum. Rare species are Silene lithuanica, Drosera anglica, D. intermedia, Aldrovanda vesiculosa, Utricularia minor, U. intermedia, and Nymphaea candida. Only 1 sp. each of Litorella uniflora (observed some years ago), Isolepis setacea, Isoetes lacustris, and Petasites spurius was also encountered.--Copyright 1973, Biological Abstracts, Inc.
W73-10398

2I. Water in Plants

DISTRIBUTION OF MICROARTHROPODS IN SPRUCE-FORESTS OF THE CHONKEMIN RIVER (TYAN-SHAN), (IN RUSSIAN),
Leningrad State Univ. (USSR). Dept. of Entomology.
P. P. Vtorov, and E. F. Martynova.
Zool Zh. Vol 51, No 3, p 370-375. 1972. English summary.
Identifiers: *Arthropods (Distribution), Biomass, China, *Chon-Kemin River, Forests, Mites, Rivers, Soils, Springtails, *Spruce-G, Tyan-Shan.

The upper horizons of the litter and soil were studied for assessing microarthropod numbers and biomass; the animals were distributed into size-weight classes. In all the habitats (under the spruce-tree crown, under the edge of the crown, moss-shade-herb spruce forest, herboso-graminetum meadow in spruce-forest) mites predominated as to numbers. As a biomass, springtails predominated. The biomass of mites ranged from 520 to 1905 mg/m2, that of collembolans from 300 to 2473/m2. Twenty spp. of springtails were obtained in the samples.--Copyright 1972, Biological Abstracts, Inc.
W73-09794

THE INFLUENCE OF ANNUAL FLOODING ON POPULATION CHANGES OF SOIL ARTHROPODS IN THE CENTRAL AMAZONIAN RAIN FOREST REGION,
Ruhr-Universitaet Bochum (West Germany).
L. Beck.
Pedobiologia. Vol 12, No 2, p 133-148, 1972. Illus. English summary.
Identifiers: *Arthropods (Soil), *Flooding (Annual), Forests, Population, *Rain forests, Rostrozetes-foveolatus, Soils.

The soil arthropods of the flood forests are subjected to extreme changes which are caused by annual flooding. The macro-arthropods seek refuge from these in the more elevated woods. The meso-arthropods remain in flooded soil. The oribatid mites of the flood forests investigated in more detail do not differ in their ecological requrements from those of the surrounding terra firma. They can only live in the flood area because their developmental cycle is adapted to the annual rhythm of the flooding. In general, this is achieved by a developmental cycle as short as 3-5 mo. Rostrozetes foveolatus is the only oribatid species of the flood forests with a post-embryonic development of more than 5 mo. The other species survive flooding in the egg, whereas R. foveolatus tolerates these conditions as an adult. Its eggs grow during the submerged phase and are laid just after the water has receded. This developmental cycle is characterized by parthenogenesis, which is a necessary prerequisite for a terra firma species such as R. foveolatus to invade the flood areas.--Copyright 1972, Biological Abstracts, Inc.
W73-09860

AFRICAN JOURNAL OF TROPICAL HYDROBIOLOGY AND FISHERIES.
East African Freshwater Fisheries Research Organization, Jinja (Uganda).

Vol I, No 1, 1971. Semi-annually. East African Literature Bureau: P.O. Box 30022, Nairobi, Kenya. Pr. $10.00.
Identifiers: *Africa, Fisheries, *Hydrobiology, Tropical, Publications, Documentation.

This journal will accept original manuscripts which are relevant to the African aquatic environment. Topics will include: fish and fisheries, freshwater and marine biology, limnology, parasitology, fisheries economics, fish processing, aquatic weeds, rural fishing development, fishing gear technology and development and other fields in the aquatic sciences. Short notes, reviews of hydrobiological and fisheries and book reviews are also solicited. Its quality will conform to International standards and will be published in English and French, with English being the preferred language. A short resume in English must accompany articles in French.--Copyright 1972, Biological Abstracts, Inc.
W73-09903

STUDY OF THE BIOCENOSIS OF THE BOTTOM OF THE RIVER PO AT TRINO VERCELLESE IN THE YEARS 1967-68 (IN ITALIAN),
Milan Univ. (Italy). Laboratorio di Zoologia.
V. Parisi, P. Magnetti, M. Dotti, M. Michelangeli, and A. P. DiChiara.
Ist Lombardo Accad Sci Lett Rend Sci Biol Med B., Vol 105, No 1, p 3-56, 1971. Illus. English summary.
Identifiers: Amphipoda, *Biocenosis, Bottom, *Italy, Mollusca, Oligochaeta, *Po River, Trichoptera, Trino, Vercellese.

A sketch of the bottom communities of the Po river shows 88 spp. of animals. The most common were species of Oligochaeta Amphipods, Trichoptera and Mollusca.--Copyright 1972, Biological Abstracts, Inc.
W73-09912

STUDIES ON THE RELATIVE GROWTH RATE OF SOME FRUTICOSE LICHENS,
Turku Univ. (Finland). Dept. of Botany.
L. Karenlampi.
Ann Univ Turku Ser A II Biol Geogr. 46, p 33-39. 1971. Illus.
Identifiers: Cetraria-Nivalis, Cladonia-Alpestris, Cladonia-Mitis, Cladonia-rangiferina, *Fruticose lichens, *Growth rate (Plants), Lapland, *Lichens, Rainfall, Stereocaulon-Paschale.

Observations were made of the relative growth rate (RGR) of some lichens that were grown in plastic boxes in a natural environment. Weight growth was determined in the laboratory on air-dry material, a correction to oven-dry weight being made. Length growth was measured from photographs. The material included Cladonia alpestris (different sizes and different parts), C. rangiferina, C. mitis, Stereocaulon paschale and Cetraria nivalis. Growing in boxes seemed to give a good starting point for productivity calculations. Daily rainfall was found to be the dominant controlling climatic factor of the RGR in this area of Lapland. The distribution of RGR of weight in the thallus was found to correspond to the results of earlier studies. No significant differences could be shown between the RGRs calculated from the weights of the reindeer lichen species, but these values seemed to be higher than those of Stereocaulon and Cetraria.--Copyright 1972, Biological Abstracts, Inc.
W73-09972

GROWTH AND WATER USE OF LOLIUM PERENNE: I. WATER TRANSPORT,
Rothamsted Experimental Station, Harpenden (England).
D. W. Lawlor.
J Appl Ecol. Vol 9, No 1, p 79-98. 1972. Illus.
Identifiers: Absorption, Conductivity, Distribution, *Lolium-perenne-M, *Plant growth, Soils, *Transpiration, Transport, Vertical, Water potential (Plants).

Water absorption and transpiration are considered in relation to the gradients of water potential between the soil and the leaves of L. perenne

grown in a small volume of sandy soil. The vertical distribution of water potential within the soil during a drying cycle was estimated and a calculated value of soil-water potential related to water loss. Small changes in soil-water potential diminished water loss, because the stomata closed when plant-water potential decreased by 2-3 bar. Plant-water potential decreased from a maximum of -3 bar when the integrated soil-water potential decreased to -1 bar. With more severe stress, plant-water potential decreased faster than soil-water potentials, because of increased plant resistance. The gradients of water content and potential between the bulk soil and the root surface were calculated. The gradients were very small when all the roots were considered and the soil-water potential was above wilting. Larger gradients were predicted at more severe plant water stress if water flowed into the larger roots only. The total resistance of the plant and soil (Rp + Rs) increased from 20 bar day cm-1 at -3 bar plant-water potential to 300 at -16 bar. Within the range from full to zero turgor, Rp greatly exceeds Rs, although Rs increased much faster than Rp. Rp increased as the plant-water potential decreased. Some difficulties of estimating the gradients of soil-water potential and the relative magnitudes of Rs and Rp are considered and also the relation of Rs to soil-water conductivity. (See also W73-09974)--Copyright 1972, Biological Abstracts, Inc.
W73-09973

GROWTH AND WATER USE OF LOLIUM PERENNE: II. PLANT GROWTH,
Imperial Coll. of Science and Technology, London (England). Dept. of Botany.
D. W. Lawlor.
J Appl Ecol. Vol 9, No 1, p 99-105. 1972.
Identifiers: Dry matter, Leaves, *Lolium-perenne-M, Matter, *Plant growth, *Turgor, Water potential (Plants), Leaves.

The effects of decreasing water potential of the soil and plant on growth of L. perenne were studies. Leaf and root extension growth decreased by 50% when plant water potential decreased from -3 bar to -6 bar and growth stopped at -16 bar. Dry matter accumulation and leaf area also decreased becaus of slower expansion growth and senescence of the older leaves. Growth cannot be related to water potential with accuracy because of the rapid changes of soil- and plant-water potential but a small decrease in soil-water potential has a large effect on growth because of the more rapid decrease in plant water potential due to a large plant resistance. The importance of turgor in growth is considered. The causes of increased plant resistance and decreased growth are briefly discussed. (See also W73-09973)--Copyright 1972, Biological Abstracts, Inc.
W73-09974

EFFECT OF SOIL MOISTURE ON THE GROWTH OF ANNUAL SEEDLINGS OF THE GREEN ALDER, ALNUS VIRIDIS, AND THE GREEN ASH, FRAXINUS VIRIDIS, (IN BYELORUSSIAN),
M. D. Nesterovich, T. F. Deryugina, and B. S. Aliker.
Vyestsi Akad Navuk B SSR Syer Biyal Navuk. 2. p 5-11. 1972. Illus.
Identifiers: Alder, Alnus-Viridis, Ash, Fraxinus-Viridis, *Green alder, Seedlings, *Soil moisture, Transpiration, *Plant growth, *Green ash.

The development, anatomical and physiological characters of the seedlings cultivated in soil of 20, 40, 60, 80% humidity were studied. The humidity of 20% was not enough for growth seedlings of green alder. The decrease in soil humidity from 80% to 20% decreased seedling height by 23.8-61.3%, main root length by 22.2-51.9%, stem diameter by 28.2-48.7% and assimilation intensity by 8.1-27.9%. Decreases in total and free water in the leaves and the transpiration coefficient were also observed in the same conditions.--Copyright 1973, Biological Abstracts, Inc.
W73-09977

DISTRIBUTION OF THE PHYTOPHYLLIC INVERTEBRATES AND METHODS OF THEIR QUANTITATIVE EVALUATION. (1), (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
L. I. Zimbalevskaya.
Gidrobiol Zh, Vol 8, No 2, p 49-55, 1972, Illus, English summary.
Identifiers: Density, *Invertebrates (Distribution), *Phytophyllic invertebrates, Quantitative factors, Weight, Sampling.

Quantitative treatment of samples of phytophyllic invertebrates, obtained with a hydrobiological net, showed the relationships on the number of samples taken, their weight, and population density. The optimal weight of samples for different ecological vegetation groups-submerged and semi-submerged was different, and was determined by the morphological structure peculiarities. The variability coefficient is proposed for use to establish aggregative and mosaic distribution of invertebrates.--Copyright 1972, Biological Abstracts, Inc.
W73-10007

BIOHYDRODYNAMIC DISTINCTION OF PLANKTON AND NEKTON (IN RUSSIAN),
Institute of Biology of the Southern Seas, Sevastopol (USSR).
Yu. G. Aleev.
Zool Zh, Vol 51, No 1, p 5-12, 1972, Illus, English summary.
Identifiers: Hydrodynamics, *Nekton, *Plankton, Reynolds number.

Biohydrodynamic distinctions of plankton and nekton are considered. Indices for distinguishing between plankton and nekton obtained in experimental studies are given. Plankton and nekton are regarded as eco-morphological types. The ecological importance of the factor characterized by the Reynolds number (Re) is noted.--Copyright 1972, Biological Abstracts, Inc.
W73-10008

ECOPHYSIOLOGICAL STUDIES ON HEAVY METAL PLANTS IN SOUTHERN CENTRAL AFRICA,
Munester Univ. (West Germany).
W. Ernst.
Kirkia. Vol 8, No 2, p 125-145. 1972. Illus.
Identifiers: Africa, Bioassay, Cells, Chromium, Copper, Eco, Grasses-M, *Heavy metals, Indigofera-D, Lead, Leaves, Nickel, Nutrients, *Physiological studies (Plants), Rhodesia, Sedges-M, Shrubs, Trees, Zambia, Zinc.

Investigations into the ecology and ecophysiology of heavy metal plants were carried out in south central Africa, one site on the Zambian Copperbelt, the remainder in Rhodesia. Correlated with the gradient in the concentrations of plant-available heavy metals there is a well-established zonation; on the highest metal contaminated areas there is a treeless zone of sedges and grasses, followed by small shrubs and stunted trees. All the normal macronutrients are as available as in normal soils. The uptake of heavy metals depends on their solubility status in the soil. It was shown by a bioassay that, for instance, Cu is present as an organic plant-available compound. The uptake of heavy metals is specific for each species, and within 1 species, for different tissues. The greatest accumulation of heavy metals is in the leaves, as well as in the cortex of the shoots and roots; the xylem or wood of both shoots and roots has only small amounts. In relation to the very high levels of plant-available Cu in some soils, the Cu uptake by plants is comparatively lower than that of Zn, Cr, Ni and other heavy metals. Extractions of the tissues of leaves, shoots, and roots has revealed that the binding of heavy metals within the cells is specific to the individual metal. Cr and Pb are very tightly bound in contrast to Zn and Cu. However, there are great differences among various tissues. The plasmatic resistance of various populations of Indigofera against heavy metals is highly specific for individual heavy metals as well as being related to the amount of plant-available heavy metals in the soil.--Copyright 1972, Biological Abstracts, Inc.
W73-10012

ASPECTS ON PRODUCTIVITY IN REED-FEEDING INSECTS, (IN GERMAN),
Vienna Univ. (Austria). Zoologisches Institut.
W. Waitzbauer.
Verh D Tsch Zool Ges. 65: p 116-119. 1971. English summary.
Identifiers: Diptera, *Insects (Herbivorous), Lepidoptera, Phragmites-Communis, *Productivity (Plants), *Reeds, Rhynchota.

The present work investigates the influence of herbivorous insects on the productivity of Phragmites communis. The investigations were done in the reed-belt on the westshore of the Lake 'Neusiedler See' in eastern Austria. Several groups of Phragmites-consumers of the orders of Lepidoptera, Diptera and Rhynchota were distinguished: gall-formers on the top or in the inside of the plant; stem-miners; shoot-suckers and leaf-suckers. Not even the stem-miners with an extensive distribution in the reed-belt and great consumption-rate influenced the growth of Phragmites. The gall-formers damage the plants heavily by destroying their vegetation tips. They have a local distribution with suboptimal stock of reeds. Stem-suckers and leaf-suckers are abundant and are parasites of Phragmites. It seems therefore that herbivorous insects have an insignificant influence on the productivity of living Phragmites.--Copyright 1973, Biological Abstracts, Inc.
W73-10064

METHODS OF MEASURING DRIFT FOR PRODUCTION BIOLOGY STUDIES IN RUNNING WATERS, (IN GERMAN),
Max-Planck-Institut fuer Limnologie, Schlitz (West Germany). Limnologische Flussstation.
M. P. D. Meijering.
Verh D Tsch Zool Ges. 65: p 69-73, 1971. Illus. English summary.
Identifiers: *Drift measuring, *Gammarus, Measuring methods, Production, Running waters.

All gammarids leaving a 10 m long section of a woodland tributary by drifting downstream, together with those moving upstream, were counted over a period of 28 days. Losses from both ends of the controlled section halved its Gammarus-population within 20 days. The daily losses from drifting remained fairly constant at between 1 and 2% of the standing crop. During the first and second week those moving upstream were the more numerous, but later these movements were almost entirely stopped.--Copyright 1973, Biological Abstracts, Inc.
W73-10065

PRODUCTION ECOLOGY OF GLACIER BROOKS IN ALASKA AND LAPLAND, (IN GERMAN),
Bundesanstalt fuer Land- und Forstwirtschaft, Berlin (West Germany). Institut fuer Zool. Biol.
A. W. Steffan.
Verh Dtsch Zool Ges. 65, p 73-78. 1971. Illus. English summary.
Identifiers: *Alaska, Animals, Brooks, Diamesa, Ecology, Gracier brooks, *Lapland, Plants, *Productivity studies, Prosimulium, Scandinavia.

Glacier brooks in Scandinavia and Alaska were investigated for elucidating the biocoenotic relations and production ecology of their animal communities: This ecosystem is regarded as a distinct biotope-biocoenosis-type (kryocoen) differing in both abiotic and biotic peculiarities from other freshwater-holocoenoses (krenocoen, rhithrocoen). As the water of true glacier brooks consists mainly of just melted ice, it holds almost no dissolved inorganic or organic substances. Hence, there is a constant lack of primary (photoautotrophic) production. All members of glacier brook biocoenoses (metakryon: Diamesa; hypokryon: Diamesa, Prosimulium) are primary consumers. Their nourishment is of allochthonic origin, and consists of plant and animal particles, brought into the glacier brook, either by the wind terrestrial surrounding or by the glacier water from the melted ice. Thus, glacier brooks have to be regarded as simple ecosystems with an allotrophic structure and a low heterotrophic production rate.--Copyright 1973, Biological Abstracts, Inc.
W73-10081

INVESTIGATION OF THE ORGANIC--MINERAL COMPLEXES OF IRON IN THE BIOLOGIC CYCLE OF PLANTS,
Commissariat a l'Energie Atomique, Cadarache (France). Centre d'Etudes Nucleaires.
A. Saas, and M. Matteoli.
Kerntechnik. Vol 14, No 6, p 269-271. 1972. Illus.
Identifiers: Accumulation, Biological cycle, Gas chromatography, *Iron, Iron-59, *Minerals, Oak, *Organic compounds, Plants, Radiography, Soils.

Fe was used in the study of its biological cycle to identify the organic complexes in leaching by rain and in soil. Rainwaters and aqueous extracts from the soil were dialyzed to separate the small molecules from the polymerized compounds; the obtained solutions were passed on H+ resins to fix Fe in the ionic state and the aminated acids, then on OH- resins to fix anionic complexes, phenolic and carboxylic acids. The diverse fractions were then chromatographed: on plates to determine organic-mineral complexes by autoradiography, in the gaseous phase to study organic compounds linked to the Fe. The injection of Fe into oaks showed the absorption of Fe through the leaves by the lixiviation by the rain on the shrubby stratum, its accumulation and its evolution on the soil.--Copyright 1973, Biological Abstracts, Inc.
W73-10084

ASSOCIATION COEFFICIENTS OF THREE PLANKTONIC ROTIFER SPECIES IN THE FIELD AND THEIR EXPLANATION BY INTERSPECIFIC RELATIONSHIPS: (COMPETITION, PREDATOR-PREY RELATIONSHIPS), (IN GERMAN),
Munich Univ. (West Germany). Zoologisch-Parasitologisches Institut.
U. Halbach.
Oecologia (Berl). Vol 9 No 4, p 311-316. 1972. (English summary).
Identifiers: Asplanchna-Brightwelli, Brachionus-Calyciflorus, Brachionus-Rubens, Competition, *Plankton, *Predatorprey relationships, *Rotifers, Species.

Coefficients of interspecific association of 3 rotifer species (Brachionus calyciflorus, B. rubens, Asplanchna brightwelli) of 314 plankton samples from about 100 ponds in South Germany were determined: 2 coefficients basing on present-absent data, 1 coefficient regarding population density, and 1 coefficient of partial interspecific association taking in mind the presence or absence of the third sp. Some of the computed coefficients are significantly positive or negative indicating that joint appearances are sometimes more and sometimes less frequent than expected by chance. Most of these results can be interpreted by the knowledge of interspecific relationships, vz. competition between B. calyciflorus and B. rubens, and predator-prey relationships between A. brightwelli and B. rubens which had been detected in former studies. In each case the association between 2 of the species is modified by the presence of the third. The causes (alternative prey, destruction of the competitors etc.) are discussed.--Copyright 1973, Biological Abstracts, Inc.
W73-10153

RESEARCH ON THE FOREST ECOSYSTEM. SERIES C: THE OAK PLANTATION CONTAINING GALEOBDOLON AND OXALIS OF MESNIL-EGLISE (FERAGE). CONTRIBUTION NO. 17: ECOLOGICAL GROUPS, TYPES OF HUMUS, AND MOISTURE CONDITIONS, (IN F RENCH),
A. Froment, G. Schnock, and M. Tanghe.
Bull Soc R Bot Belg. Vol 103 No 2, p 293-310. 1970. Illus. (English summary).
Identifiers: *Belgium, Coryletum, Drainage, Ecological groups, Ecosystems, Forage, Forests, Galeobdolon, Humus, *Mesnil-Eglise, Moisture, Number, *Oak, Oxalis, Querceto, Soil types, *Flora (Ground).

The ecological groups of the Querceto-Coryletum ground flora from Ferage (Mesnil-Eglise near Dinant, Belgium) are distributed in distinct concentric areas. The spreading of the groups is connected with the different humus forms of mull type. The study of the soil water content and the observation of the water-level shows that these areas have different water regime; the infiltrating water flows laterally in the pedological layers. The lateral drainage is due to the slope (about 3%) and to the higher clay content of the B and B/C horizons of the soil. In the Ferage forest, water regime of the soil is an important ecological factor for the generation and the distribution of the humus types and their corresponding ecological groups of the ground flora.--Copyright 1973, Biological Abstracts, Inc.
W73-10161

THE ROLE OF ALGAE AND MOSSES IN CREATING THE LIME CONTENT OF SPRINGS IN THE BUKK MOUNTAIN RANGE, (IN HUNGARIAN),
H. Attila.
Bot Kozlem. Vol 57 No 3, p 233-244. 1970. Illus.
Identifiers: Achnanthes, *Algae, Brachythecium-Rutabulum, *Bukk Mountain range, Carbon dioxide, Concephalum, Cratoneuron-Commutatum, Cratoneuron-Felicinum, Diurnal, Eupatorium - Cannabinum, Gomphonema, *Hungary, Leptothrix-Ochracea, *Lime, *Mosses, Navicula, Nitzschia, Pelonema-Tenue, Petasites-Albus, Petasites-Hybrides, Springs.

The CO2 absorption of mosses and algae is a major factor in the deposition of lime formations in mountain springs. In the Karst streams of the Bukk mountains, the algae promote the formation of CaCO3. The preponderance and large number of species of some pebble moss facilies (Navicula, Nitzschia, Achnanthes, Gomphonema) is rather remarkable. Calcified algal colonies of the Monosbeli Vizfo form pieces that go into building the stony masses of cauliflower-like shape in that area. There are also iron bacteria (Leptothrix ochracea) among the algal colonies of the Haromkuti-volgi Valley. One of these is Pelonema tenue in the Szalajka-brook. Among the moss species of the lime building brooks of the mountain, the most common are Brachythecium rutabulum (found in 14 locations), Cratoneuron filicinum (in 11), C. commutatum (in 8), Conocephalum conicum (in 5), and Mnium undulatum (in 5). The frequent occurrence of Brachythecium rutabulum in freshwater lime-forming streams was not previously reported. In the mountain area one also finds both species of Cratoneurum, and in some places these two are the only mosses found. The mossland built by C. commutatum created the Bryolith Steps of the Pacsirta Spring in Tal Szentleleki-volgy. Vegetative rather than generative (spore) multiplication is probable here, with detached stalk parts or other propagating amalgamations. As algae and mosses diminish the CO2 content of the flowing water, the travertino formation in such areas shows a diurnal rhythm. Among the species of mosses of high order of the Bukk mountains Eupatorium cannabinum, Petasites hybrides and P. albus are the most common. The prevalence of P. albus at the Feheracsas Spring of Tal Nagyszallas-volgy, and the colonies of Bolhasi Wasserschlinger indicates a further spreading of P. albus in the Bukk mountains. Aside from the production of limestone, the form and structure of the calcareous tufa is also determined by the vegetation.--Copyright 1973, Biological Abstracts, Inc.
W73-10162

CONTRIBUTIONS TO THE STUDY OF THE BIOLOGY OF THE ASSOCIATION FESTUCETUM VALESIACAE BURD. ET AL., 1956 IN THE MOLDAVIAN FOREST STEPPE, (IN RUMANIAN),
Institutul Agronomic, Iasi (Rumania).
D. Rosca.
Inst Agron Ion Ionescu De La Brad Iasi Lucr Stiint I. Agron-Hort. 1970, p 233-254. 1970. Illus. Map. (English summary).
Identifiers: Festucetum-Valesiacae, Forests, Humus-Rich, *Moldavian Forest steppe, Slopes, Soils, Steppe, *Xerophilous variants, *Romania.

Two ecological variants were determined: a xerophilous variant of dry stations and a mesox mesoxerophilous variant of stations with more favorable water conditions. The conclusion is reached that this association is encountered especially on NE or NW facing slopes, on deep soils, rich in humus, with slightly acid or slightly alkaline reaction, not salinized, and with a high exchange capacity.--Copyright 1973, Biological Abstracts, Inc.
W73-10163

PRELIMINARY DATA ON THE VEGETATIVE REPRODUCTION AND ORGANOGENESIS OF SOME AQUATIC PLANTS, (IN RUMANIAN),
Bucharest Univ. (Rumania).
M. Andrei.
An Univ Bucur Biol Veg. 19. p 163-182. 1970. Illus.
Identifiers: *Aquatic plants, Batracium, Ceratophyllum-Demersum, Hydrocharis-Morsus-Ranae, Myriophyllum-Spicatum, Nymphaea-Alba, Nymphoides-Peltata, *Organogenesis, Phragmites-Communis, Potamogeton-Crispus, Potamogeton-Perfoliatus, *Romania, Rorippa-Amphibia-F-Auriculata, Rorippa-Sylvestris, Stratiotes-Aloides, Typha-Angustifolia, Utricularia-Vulgaris, *Vegetative reproduction.

Vegetative reproduction was discussed for Batrachium trichophyllum, Nymphaea alba, Ceratophyllum demersum, Rorippa amphibia f. auriculata, R. sylvestris, Myriophyllum spicatum, Utricularia vulgaris, Nymphoides peltata, Stratiotes aloides, Hydrocharis morsus-ranae, Potamogeton perfoliatus, P. crispus, Typha angustifolia and Phragmites communis. Reproduction by layering is predominant and almost general in aquatic plants. The formation of turions is determined by a decrease in the temperature of the habitat. The common aquatic plants of the Crapina-Jijila (Romania) lake complex reproduce by natural layering.--Copyright 1973, Biological Abstracts, Inc.
W73-10164

VEGETATION AND STRATIGRAPHY OF PEATLANDS IN NORTH AMERICA,
H. Osvald.
Acta Univ Ups Nova Acta Regiae Soc Sci Ups Ser V C. 1, p 7-94 1970. Illus.
Identifiers: Chamaedaphne, Climates, Larix, Ledum-Groenlandicum, Ledum-Palustre, *North

America, *Peatlands, Picea, Pinus, *Stratigraphy, *Vegetation.

In North America there are types of mires corresponding to most of the European ones. The most striking difference is that types similar to the west European types of bog, with stagnation and erosion complexes, have not yet been described. The bogs close to the east coast are even more similar to the continental bogs in Europe than to bogs belonging to the western maritime type. In the flat bogs of Nova Scotia Chamaedaphne has a prominent role, while this dwarf-shrub is lacking on all bogs in western Europe. In western North America Ledum groenlandicum is the predominant dwarf-shrub on the bogs close to the coast (even on Queen Charlotte Islands), while in Europe L. palustre only forms communities on bogs far away from the ocean coast. There are trees (Picea, Larix, or Pinus) on all raised bogs in North America, but not in the westernmost parts of Europe. Bogs strongly influenced by the maritime climate in North America show several features which in Europe are found only on bogs of a fairly continental type. It seems probable that these differences are due to differences in the summer climate. The bog areas in North America have a considerably warmer summer climate than the corresponding areas in Europe. The exceptions from this rule, Newfoundland and the extreme maritime zone of the Pacific coast, are not discussed. Fires have played and are still playing a prominent role in the development of the mires in North America and affect the composition of the plant communities and the boundaries between them. This phenomenon is characteristic not only of peat-land vegetation but also of the vegetation on mineral soil, such as heaths, meadows, grasslands and woodlands. Since areas with vegetation that may be ravaged by fires are much more common in North America than in Europe, it is often difficult to separate the different plant communities from each other. Instead of fairly clear boundaries between the plant communities, there is quite frequently a gradual change in the composition from one plant community to an adjacent one. The same phenomenon may also be due to influences other than fires, for instance, grazing.--Copyright 1973, Biological Abstracts, Inc.
W73-10165

AUTORADIOGRAPHY AS A TOOL IN PRIMARY PRODUCTION RESEARCH,
Brussels Univ. (Belgium).
J. P. Mommaerts.
Neth J Sea Res. Vol 5 No 4, p 437-439. 1972.
Identifiers: *Autoradiography, *Phyto-plankton, *Primary production, Photosynthesis.

Autoradiography of C-14 labeled phytoplankton collected onto a millipore filter allows the determination of the number of photosynthetically active cells in a water sample and thus gives useful information on the standing crop in primary production studies.--Copyright 1973, Biological Abstracts, Inc.
W73-10168

SYSTEMS ANALYSIS OF MINERAL CYCLING IN FOREST ECOSYSTEMS,
Goettingen Univ. (West Germany).
For primary bibliographic entry see Field 02K.
W73-10188

BEHAVIOUR OF RU IN AN ESTABLISHED PASTURE SOIL AND ITS UPTAKE BY GRASSES,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
For primary bibliographic entry see Field 05B.
W73-10192

DISTRIBUTION OF RADIOSTRONTIUM AND RADIOCAESIUM IN THE ORGANIC AND MINERAL FRACTIONS OF PASTURE SOILS AND THEIR SUBSEQUENT TRANSFER TO GRASSES,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
For primary bibliographic entry see Field 05B.
W73-10193

A PRELIMINARY LIST OF INSECTS AND MITES THAT INFEST SOME IMPORTANT BROWSE PLANTS OF WESTERN BIG GAME,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
M. M. Furniss.
USDA Forest Service Research Note INT-155. February 1972. 16 p, 26 ref.

Descriptors: *Insects, *Mites, *Shrubs, *Wildlife, *Forages, Idaho, Pacific Northwest U.S., Systematics, Willow trees, Big game, Entomology.
Identifiers: Serviceberry, Bitterbrush, Mountain mahogany, Ceanothus.

This list is organized alphabetically by scientific names of the host plants and species, the latter by order, family, genus, and species. Parts of plants damaged are indicated when known. Omitted are all parasitic and predacious species. Most records are from Idaho and adjacent states. Collections have been most intensive on bitterbrush, a shrub attacked by large numbers and many kinds of insects. Other genera important as browse for western big game, such as deer, elk, moose, antelope, bighorn sheep, and mountain goat, that are cited in this list include ceanothus, mountain mahogany, willow, and serviceberry. (Paylore-Arizona)
W73-10218

PRELIMINARY ANNOTATED LIST OF DISEASES OF SHRUBS ON WESTERN GAME RANGES,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
R. G. Krebill.
USDA Forest Service Research Note INT-156. February 1972. 8 p, 29 ref.

Descriptors: *Plant diseases, *Shrubs, *Forages, *Wildlife, Air pollution, Bacteria, Fungi, Viruses, Sagebrush, Willow trees, Pacific Northwest U.S., Southwest U.S., Rocky Mountain region, Big game.
Identifiers: Chokecherry, Ceanothus, Mountain mahogany, Bitterbrush.

Lists 7 genera of shrubs browsed by big game in the western U.S., excluding Alaska, Hawaii, and Texas, with indications of diseases that attack the various species of each, and the locations of observed attacks. Diseases caused by fungi, bacteria, viruses, and parasitic plants, as well as common physiogenic problems such as winter injury, are included. Only those organisms known to be pathogenic to browse hosts are cited. Air pollution as it affects certain genera is cited. (Paylore-Arizona)
W73-10219

ALGAE FLORA IN THE UPPER PART OF GULCHA RIVER (IN RUSSIAN),
B. K. Karimova.
Uzb Biol Zh. Vol 15, No 5, p 30-32. 1971.
Identifiers: *Algae, *Diatoms, *Gulcha River, Oligosaprobic water, Rivers, Cyanophyta, USSR, *Agnatic plants.

The study was carried out during the summer-autumn period of 1969. The water temperature on July 22 and Aug. 12 at 5 PM was recorded to be 10.2 deg C. Altogether 106 spp., varieties or forms of algae were detected. Of these one belonged to golden algae, 13 were green algae, 15 blue-green, and 77 diatoms. All these algae are characteristic of clean oligosaprobic freshwater, since the water in Gulcha river is clean and is not contaminated with communal wastes.--Copyright 1973, Biological Abstracts, Inc.
W73-10311

VEGETATION OF PRAIRIE POTHOLES, NORTH DAKOTA, IN RELATION TO QUALITY OF WATER AND OTHER ENVIRONMENTAL FACTORS,
Geological Survey, Washington, D.C.
R. E. Stewart, and H. A. Kantrud.
For sale by GPO, Washington, D.C. 20402 - Price $0.60. Professional Paper 585-D, 1972. 36 p, 38 fig, 6 tab, 13 ref.

Descriptors: *Vegetation, *Potholes, *Water quality, *Grasslands, *North Dakota, Marsh plants, Wetlands, Water analysis, Chemical analysis, Salinity, Plant growth, Environmental effects, Aquatic plants, Ponds, Freshwater, Brackish water, Saline water, Hydrology.
Identifiers: *Water quality-plant growth relationships.

The influence of surface water chemistry upon the species composition and distribution of marsh and aquatic plants in northern prairie areas of North Dakota is described. Salinity of surface waters was closely correlated with differences in species composition of plant communities found in the principal vegetational types. Land-use practices of varying degrees of intensity also had a secondary influence on species composition. Characteristic species of wetland vegetational types occupied the central deeper parts of pond and lake basins or occurred as concentric peripheral bands. The wetland vegetational types are wetland low-prairie, wet-meadow, shallow-marsh emergent, deep-marsh emergent, fen emergent, submerged and floating, natural drawdown, cropland drawdown, and cropland tillage vegetation. Combinations of species (plant associations) within these vegetational types were placed in one of six salinity categories designated as fresh, slightly brackish, moderately brackish, brackish, subsaline, and saline. Salt tolerance varied greatly among the various marsh and aquatic plants. The number of species represented in moderately brackish to saline communities decreased markedly with increased salinity of the surface water environment. (Woodard-USGS)
W73-10330

NATURAL HISTORY OF THYMALLUS ARCTICUS BAICALENSIS DYBOWSKI, 1876, ACCLIMATIZED IN THE DOBSINA RESERVOIR (CZECHOSLOVAKIA), (IN CZECH),
Slovenska Akademie Vied, Bratislava (Czechoslovakia).
J. Holcik, and R. Zitnan.
Zool Listy. Vol 21, No 2, p 181-191, 1972. Illus.
Identifiers: Amphipods, *Czechoslovakia, *Dobsina Reservoir (Czech), Food (Fish), Natural history, Reservoirs, *Thymallus-arcticus-baicalensis.

T. arcticus baicalensis was acclimatized in the Dobsina reservoir in 1959. When the fish completes its second yr of life sexual maturity sets spontaneously in both sexes. Spawning takes place only in running water of the tributaries, 20-50 cm deep, with stony and sandy bed, in April when water temperature rises to 10C. Growth rate is high as compared to that of the ancestral population and other forms, but is strongly reduced after the second year of life. This is probably due to lack of amphipods, the important and specific food component of the diet of the ancestral population in Lake Baikal. Introduction of amphipods is therefore recommended. The fish may be suitable for stocking of submountain man-made lakes.--Copyright 1973, Biological Abstracts, Inc.
W73-10354

CONDITION AND PERSPECTIVES OF THE DEVELOPMENT OF POND FISH CULTURE IN THE NORTHWEST, (IN RUSSIAN),
A. S. Zonova, V. S. Kirpichnikov, I. I. Mantel'man, B. E. Petrov, and G. G. Savost'yanova.
Izv Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 74, p 154-173, 1971. English summary.
Identifiers: *Fish culture, Growth, Pond fish, Populations, USSR, *Carp.

A characterization of pond carp culture in the Leningrad, Novgorod and Pskov Oblasts is given. A statistical analysis of data from 1961-65 showed the dependence of the growth rate of fish and pond productivity on water temperature and density of the fish population. Temporary piscicultural norms for carp ponds in the region studied are given.--Copyright 1973, Biological Abstracts, Inc.
W73-10356

COMPARISON OF SOME TRIBAL GROUPS OF RAINBOW TROUT BY THEIR PISCICULTURAL VALUE, (IN RUSSIAN),
G. G. Savost'yanova.
Izv Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 74, p 87-103, 1971. English summary.
Identifiers: Fecundity, Growth, Piscicultural studies, *Tribal habits (Trout), *Trout (Rainbow), Trout (Danish).

Collective raising of underyearlings and yearlings from different tribal groups of rainbow trout showed that Danish trout had the best piscicultural indices. The most important characteristics were good growth rate, increased viability, earlier sexual maturation and high levels of fecundity.--Copyright 1973, Biological Abstracts, Inc.
W73-10357

FEEDING STATIONS AND THE DIET OF JUVENILES OF THE ATLANTIC SALMON AND THE GRAYLING IN THE LOWER REACHES OF THE SHCHUGOR RIVER, (IN RUSSIAN),
L. N. Solovkina, and V. N. Shubina.
Izv Komi Fil Geogr O-Va SSSR. Vol 2, No 3, p 82-87, 1970.
Identifiers: Caddis-Flies, Chironomids, Diet, Feeding stations (Fish), *Grayling, *Juveniles, Mayflies, Rivers, *Salmon (Atlantic), *Shchugor River, USSR.

Studies of the diet of the Atlantic salmon (I;533 specimens) and the grayling (II; 120 specimens) were made simultaneously with a hydrobiological examination of the Shchugor River. In the material collected (I) was represented exclusively by 3-yr-olds 12-15 cm long weighing 18-32 g; the coefficient of condition was 1.22-1.36. (II) was 1+ to 7+ yr old and 11-41 cm long and weighed up to 780 g; most of the (II) were 4 yr-old and 21 cm long and weighed 100 g. The biomass of the benthos in the main channel of the Shchugor averaged 5 g/m2. The benthic fauna consisted of 18 groups of organisms. The most frequently encountered in the biomass were chironomids, followed by trichopterans and caddisflies and mayflies and are the principal organisms in the diets of (I) and (II). In the (I) diet the larvae of caddisflies and mayflies are more important than chironomid larvae; mayflies are also predominant in the (II) diet. Seasonal changes in the diet of (I) and (II) coincide with changes in the biomass of the principal groups of the benthos on sandbanks. In general, (I) has a benthophagic type of diet, while (II) feeds mostly in the superficial layers of the water. Competition for food occurs only at the end of summer when the dietary spectra of (I) and (II) coincide.--Copyright 1973, Biological Abstracts, Inc.
W73-10358

SOME CHARACTERISTICS OF THE NUTRITION OF THE FISH RHODEUS SERICEUS AMARUS BLOCH, (IN HUNGARIAN),
I. Gyurko, and I. Z. Nagy.
Vertebr Hung. 12, p 11-15, 1970/1971.
Identifiers: Algae, Fish, Nutrition, Plankton, *Rhodeus-sericeus-Amarus, Zooplankton, *Hungary.

On the basis of analysis of the stomach contents of 113 specimens of the fish from several rivers in Hungary, it was determined that the species is genuinely phytophagous and stenophagous. The characteristic shows itself at the age of 2 mo. after a short-time use of zooplankton, when its phytophagy is decidedly restricted to algae. The use of higher plants by this species was not observed. The index of gut-fullness is unusally high, in yearly average attaining 38.6%. This is connected with the phytophagous nature of the species, and rises continually during the summer until it reaches 64.1% in Sept., becoming lower in fall and winter. The fish feed also in winter. Feeding intensity varies with age and size: up to 30 mm body length (less caudal fin) it increases, but thereafter it decreases in steps, reflecting the lifeperiods of the animal.--Copyright 1973, Biological Abstracts, Inc.
W73-10361

ECOPHYSIOLOGICAL STUDIES ON DESERT PLANTS: VII. WATER RELATIONS OF LEPTADENIA PYROTECHNICA (FORSK.) DECNE. GROWING IN THE EGYPTIAN DESERT,
Cairo Univ., Giza (Egypt). Dept. of Botany.
A. M. Migahid, A. M. Abdel Wahab, and K. H. Batanouny.
Oecologia (Berl). Vol 10, No 1, p 79-91, 1972. Illus.
Identifiers: Climates, Deserts, Ecology, *Egypt, *Leptadenia-pyrotechnica, Morphology, *Osmotic pressure, Physiological studies, Seasons, *Transpiration.

L. pyrotechnica (Forsk.) Decne. grows in valleys of the Eastern Desert in Egypt where the climatic and edaphic drought is very severe. The transpiration rate is low in winter months, and rises by the onset of summer. The rise in transpiration rate is not comparable with that of the evaporation. The maximum transpiration rate is generally attained earlier than the maximum of the evaporating factors, specially in summer. The transpiration curves show a rapid decrease after this maximum, despite the continuous rise of the evaporating power of the atmosphere. This points to an effective stomatal regulation. The osmotic pressure of Leptadenia is relatively low. The osmotic pressure values show narrow daily and seasonal fluctuations. L. pyrotechnica is one of the most drought resistant plants. Its xeromorphic leafless habit implies reduction in the transpiring surface, while its deep extensive roots and low transpiration rate ensure a favorable water balance. The mechanisms of drought resistance in this plant are discussed.--Copyright 1973, Biological Abstracts, Inc.
W73-10364

HUMIDITY REACTIONS OF THE YOUNG OF THE TERRESTRIAL ISOPODS PORCELLIO SCABER LATR. AND TRACHEONISCUS RATHKEI (BRANDT),
Turku Univ. (Finland). Zoophysiological Lab.
O. V. Lindqvist.
Ann Zool Fenn. Vol 9, No 1, p 10-14, 1972. Illus.
Identifiers: *Humidity, *Isopods (Terrestrial), Porcellio-Scaber, Tracheoniscus-Rathkei.

The postlarval young of P. scaber, when taken out of the marsupium of the female, are able to react to environmental humidities. Their preference is for high humidities and the reaction intensity is related to the steepness of the gradient. A low temperature (12degC) does not interfere with this ability. If the female is desiccated in dry air, the young which have been lying against the oostegites and were thus desiccated showed stronger preference for the humid side than those which had been located next to the body wall of the female and were thus protected against water loss. The young of both P. scaber and T. rathkei after their first molt show an about equal preference for high humidities. It is assumed that all developmental stages of these 2 spp. are able to react to external humidities, which may be a factor in their success in colonization of dry land. The role and origin of the marsupial fluid in terrestrial isopods is discussed.--Copyright 1972, Biological Abstracts, Inc.
W73-10371

FRENCH SPEAKING AFRICA SOUTH OF SAHARA AND MADAGASCAR, INLAND WATER PRODUCTION, (IN FRENCH),
Centre Technique Forestier Tropical, Nogent-sur-Marne (France).
J. Bard.
Bois For Tropi. 140, p 3-12, 1971. Illus. English summary.
Identifiers: *Africa, Cultures, *Fisheries, Inland waters, Madagascar, Sahara desert.

A brief description of the waters and of their fauna is followed by a review of fisheries in natural waters of intensive fish culture and of extensive (or restocking) fish culture. The possibilities in fisheries as well as fish culture are still to be fully exploited.--Copyright 1972, Biological Abstracts, Inc.
W73-10372

THE SELECTION OF ALGAE FOR MASS CULTURE PURPOSES,
Instytut Zootechniki, Oswiecim (Poland). Zaklad Doswiadczalnej Zator.
T. Bednarz, and M. Nowak.
Acta Hydrobiol. Vol 14, No 1, p 1-18, 1972. Illus.
Identifiers: *Algae, Ankistrodesmus, Chlamydomonas, Chlorella, Coelastrum, Culture, *Protein, Protococcus, Scenedesmus, Stichococcus, Tetraedron.

A total of 950 algae strains belonging to the genera Chlorella, Scenedesmus, Ankistrodesmus, Tetraedron, Coelastrum, Protococcus, Stichococcus and Chlamydomonas were isolated and subjected to a 3-stage selection for a high content of crude protein. Fifty-six strains were obtained, belonging to the genera Chlorella, Scenedesmus and Ankistrodesmus; the crude protein content varied from 43 to 65%.--Copyright 1972, Biological Abstracts, Inc.
W73-10374

CHIRONOMIDAE IN STREAMS OF THE POLISH HIGH TATRA MTS.,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
A. Kownacki.
Acta Hydrobiol. Vol 13, No 4, p 439-464, 1971. Illus.
Identifiers: Algae, *Chironomidae, Insect larvae, Moss, Streams, Tatra Mountain streams, *Bottom fauna, *Poland.

The main components of the bottom fauna in streams of the High Tatra Mts are insect larvae, especially Chironomidae (40-100% of the total number of animals). On the basis of the dominant species it is possible to distinguish 5 types of Chironomidae, distributed in accordance with changes in altitude. It was possible to show differentiation of Chironomidae associations in individual habitats (stones, moss, algae) also within particular localities, as well as the dependence of the course of seasonal changes on altitude.--Copyright 1972, Biological Abstracts, Inc.
W73-10377

GENERAL CHARACTERISTICS OF THE BIOCOENOSIS IN THE POLISH HIGH TATRAS,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
B. Kawecka, M. Kownacka, and A. Kownacki.

Acta Hydrobiol. Vol 13, No 4, p 465-476, 1971. Illus.
Identifiers: *Biocoenosis, Chamesiphon-Polonicus, Diamesa-Latitarsis, Diamesa-Steinboecki, Diatoma-Hiemale, Homoeothrix-Janthina, Hydrurus-Foetidus, Orthocladius-Rivicola, Paroorthocladius-Nudipennis, Streams, *Poland.

On the basis of algae and bottom-fauna communities in the streams of the High Tatra Mts the following zones were distinguished; the zone of high-mountain streams (at an altitude of 1550-2100 m), with community composed of Cyanophyceae (Chamaesiphon polonicus) and larvae of Chironomidae (Diamesa steinboecki, D. gr. latitarsis); the zone of the montane streams (at an altitude of 1000-1550 m) of which Hydrurus foetidus, Homoeothrix janthina, Diatoma hiemale, Baetis alpinus, Rhitrogena loyolaea, and Paroorthocladius nudipennis on substratum or Orthocladius rivicola on granite substratum are typical; the zone of the submontane streams and rivers (at an altitude of 500-1000 m) in which Diatoma vulgare var. ehrenbergii, D. vulgare var. capitulatum, Cymbella affinis, Synedra ulna, Ulothrix zonata dominate with Orthocladius rivicola, O. thienemanni, and Simuliidae.--Copyright 1972, Biological Abstracts, Inc.
W73-10378

THE EFFECT OF TEMPERATURE AND MOISTURE ON MICROFLORA OF PEAT-BOGGY SOIL, (IN RUSSIAN),
E. Z. Tepper, and T. V. Pushkareva.
Dokl Mosk S-Kh Akad Im K A Timiryazeva. 169, p 160-165, 1971.
Identifiers: *Microflora, Moisture, Peat, *Soils (Peat-boggy), Temperature.

The effect of incubation temperatures (10, 20-30 deg) and various moisture levels (40, 60-85% of total water capacity) on microflora of lowland peat-bog soil and the accumulation of mineral forms of N was studied. The soil was enriched with compost for 100 days and analyzed every 10 days. Nitrate forms of N predominated at 20-30 deg C and ammonia N at 10 deg, especially with 85% moisture. In the latter case, the activity of nitrifying agents was suppressed and N immobilization decreased since the development of aerobic cellulose-decomposing bacteria was inhibited. Excess ammonia N (due to the low absorption capacity of peat) could be lost through water drainage. Variations in the development of cellular mass of various groups of microorganisms were characterized by systematic changes in the increase and decrease of cellular mass, which were especially abrupt at higher temperatures and moisture levels.--Copyright 1972, Biological Abstracts, Inc.
W73-10381

CONTRIBUTION TO THE STUDY OF THE ALGAL FLORA OF ALGERIA,
Algiers Univ. (Algeria). Faculty of Science.
R. Baudrimont.
Bull Soc Hist Nat Afr Nord. Vol 61, No 3-4, p 155-168. 1970. Illus.
Identifiers: *Algal flora, *Algeria, *Artesian well water, Cyanophyceae, Diatoms, Sahara, Salinity, Springs, Temperature, Wells.

Artesian well water in the west Chott ech Chergui are strongly mineralized, hard, mesohaline (over 400 mg/l Cl), rich in CaSO4 and weakly alkaline. The temperature varied from 22 to 44 C, depending on the well studied. Forty-one genera and 64 spp., principally Cyanophyceae (17 spp.) and some diatoms (24 spp.), generally mesohalobes, thermophilic and alkaliphilic. These algae are common in the upper littoral in continental salt waters of the central and northern Sahara and in hot springs of Algeria. Three different diatom associations were defined in springs whose physico-chemical composition is stable during the year.--Copyright 1973, Biological Abstracts, Inc.
W73-10399

2J. Erosion and Sedimentation

KINETICS OF CARBONATE-SEAWATER INTERACTIONS,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 02K.
W73-09790

GEOLOGIC PROCESS INVESTIGATIONS OF A BEACH-INLET-CHANNEL COMPLEX, NORTH INLET, SOUTH CAROLINA,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 02L.
W73-09795

COBEQUID BAY SEDIMENTOLOGY PROJECT: A PROGRESS REPORT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 02L.
W73-09796

THE COASTAL GEOMORPHOLOGY OF THE SOUTHERN GULF OF SAINT LAWRENCE: A RECONNAISSANCE,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 02L.
W73-09797

MANIFESTATION OF EROSION IN PERMAFROST ON THE YAMAL PENINSULA (PROYAVLENIYE EROZII V MNOGOLETNEMERZLYKH PORODAKH NA YAMALE),
I. I. Shamanova.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 2, p 92-98, March-April 1971. 4 fig, 4 ref.

Descriptors: *Erosion, *Permafrost, *Geomorphology, Terraces (Geologic), Gullies, Ice, Temperature, Solifluction.

Observations were conducted in the summer of 1969 to study erosion processes in the central part of the Yamal Peninsula in Northwestern Siberia. The region is a distinctly terraced, gently undulating aggradational plain with erosion-thermokarst rills and numerous thermokarst lakes. Maximum absolute elevations (50-60 m) are confined to the fourth marine terrace and minimum elevations (5-7 m), to flood-plain terraces and low seacoast plains. The region has a severe climate with a long-term average air temperature of minus 9.5 deg C. Annual precipitation is 480 mm, most of which occurs during the cold period of the year. Snow depth on the surface of terraces generally does not exceed 20-50 cm, and snow density varies between 0.2 and 0.3 g/cu cm. A polygenetic type of continuous permafrost prevails in the region, and the depth to the bottom of permafrost is generally greater than 300-400 m. In many cases, the presence of low-temperature permafrost near the surface intensifies erosion at high geomorphological levels (third and fourth terraces). This intensification is associated with specific characteristics of mechanical erosion and thermal degradation in regions of perennially frozen ground. (Josefson-USGS)
W73-09805

VERTICAL DISTRIBUTION AND ABUNDANCE OF THE MACRO- AND MEIOFAUNA IN THE PROFUNDAL SEDIMENTS OF LAKE PAIJANNE, FINLAND,
Jyvaskyla Univ. (Finland). Dept. of Biology.
For primary bibliographic entry see Field 02H.
W73-09818

STREAM CHANNEL ENLARGEMENT DUE TO URBANIZATION,
Regional Science Research Inst., Philadelphia, Pa.
For primary bibliographic entry see Field 04C.
W73-09878

EROSION AND ACCRETION OF SELECTED HAWAIIAN BEACHES 1962-1972,
Hawaii Univ., Honolulu.
J. H. Campbell.
University of Hawaii Seagrant-TR-72-02, November 1972. 30 p, 6 fig, 10 tab, 6 ref. UNIHI-SEAGRANT-TR-72-02,HIG-72-20. NSG Grant No. 2-35-243.

Descriptors: *Hawaii, *Beaches, Erosion rates, *Accretion, *Sands, Volume, Surveys, Seasonal.

A survey of sixty Hawaiian beaches was conducted in 1972 as part of the University of Hawaii Sea Grant Program. The volume of sand and width of the beach on thirty-three beaches was compared with earlier measurements to indicate trends of erosion over a decade of time. These data are presented in tables. Surveillance was conducted summer and winter on some beaches and monthly and quarterly on others. For many beaches there was no significant gain or loss in volume of beach sand; this general conclusion appears to be true for the islands as a whole. At 14 beaches some long-term gains were evident. Some degree of erosion occurred at 14 other beaches. About half of this latter group have a chronic history of erosion and about half are newly identified. (Ensign-PAI)
W73-09879

DETERMINATION OF THE TOTAL AMOUNT OF CARBOHYDRATES IN OCEAN SEDIMENTS,
For primary bibliographic entry see Field 05A.
W73-09884

COAGULATION IN ESTUARIES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 02L.
W73-09925

DETERMINATION OF HYDROGEOLOGICAL PROPERTIES OF FISSURED ROCKS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
M. L. Parsons.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada K1A 0E8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 89-99, 1972. 3 fig, 2 tab, 27 ref.

Descriptors: *Hydrogeology, *Fracture permeability, *Groundwater movement, Fractures (Geologic), Aquifer characteristics, Canada, Model studies, Mathematical studies.
Identifiers: *Fissured aquifers, Prince Edward Island (Canada).

Groundwater flow problems in fissured rocks may be analyzed either by a discontinuum approach, which considers the hydrologic behavior of discrete fissures coupled with the exact geometry of the fissure system, or by a continuum approach, which utilizes the standard groundwater flow coefficients, the values of which are determined statistically from the geometry of fissure systems and are presumed to reflect fissure hydrologic behavior. The choice is in terms of the scale of the problem and the availability of field data. Both approaches invoke the analogy of fissure flow to parallel plate flow. The continuum approach, involving statistically determined parameters, is more practical in view of the limitations of current field technology. An idealized parallel plate model

was applied to analyze on a regional scale the influence of fissures on the bedrock permeability on Prince Edward Island. The range of directional permeabilities agrees in magnitude with average values determined by pumping tests and tidal analyses, and the orientations of the principal axes are similar, nearly vertical in the case of major axes and nearly horizontal in the case of other axes. (Knapp-USGS)
W73-09954

RELATION OF PHYSICAL AND MINERALOGICAL PROPERTIES TO STREAMBANK STABILITY,
Agricultural Research Service, Chickasha, Okla.
D. W. Goss.
Water Resources Bulletin, Vol 9, No 1, p 140-144, February 1973. 1 tab, 10 ref.

Descriptors: *Bank stability, *Stream erosion, *Bank erosion, *Clays, *Particle shape, Soil mechanics, Soil properties, Mineralogy, Clay minerals, Soil physical properties, Alluvium, Alluvial channels, *Oklahoma.
Identifiers: *Washita River (Okla).

Clay mineralogy and bulk density do not appear to be factors contributing to the relative stability of streambanks on the Washita River, Oklahoma. The Washita River basin does not have a large enough variety of clay minerals to determine the effect of clay mineralogy on streambank stability. The total clay content may contribute to stability. Sand grain shape and clay distribution seem to have the greatest potential in explaining some of the relative differences in streambank stability. The sand-sized grains of the stable areas were less rounded than those of the unstable areas. This somewhat angular shape of the grains may have produced an interlocking between grains that added stability to the bank material. Also, clay coatings on the sand-sized grains from the stable areas may have caused cementation between grains. (Knapp-USGS)
W73-09993

SILTATION PROBLEMS IN RELATION TO THE THAMES BARRIER,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 08A.
W73-09997

AVALANCHE MODE OF MOTION: IMPLICATIONS FROM LUNAR EXAMPLES,
Geological Survey, Menlo Park, Calif.
K. A. Howard.
Science, Vol 180, No 4090, p 1052-1055, June 8, 1973. 3 fig, 19 ref.

Descriptors: *Landslides, *Avalanches, *Mass wasting, Rockslides, Degradation (Slope), Movement.
Identifiers: *Moon.

A large avalanche (21 square kilometers) at the Apollo 17 landing site moved out several kilometers over flat ground beyond its source slope. If not triggered by impacts, then it was as 'efficient' as terrestrial avalanches attributed to air-cushion sliding. Evidently lunar avalanches are able to flow despite the lack of lubricating or cushioning fluid. (Knapp-USGS)
W73-10038

BEACH RIDGE SLOPE ANGLES VS AGE,
Florida State Univ., Tallahassee. Dept. of Geology.
W. F. Tanner, and J. C. Hockett.
Southeastern Geology, Vol 15, No 1, p 45-51, April 1973. 2 fig, 2 ref.

Descriptors: *Beaches, *Geomorphology, *Dating, *Topography, *Degradation (Slope), Erosion, Slopes, Florida, Pleistocene epoch, Recent epoch.

Sixteen beach ridge sets, including 76 Holocene beach ridges, were studied in northwest Florida. All ridge sets at any one age have the same side slopes; older ridges have gentler side slopes. No ridges, on sand of the same size and under the same climate, should be visible after about 170,000 years. Correlation of slopes and ages can be used for estimating ridge age where materials are not too course. (Knapp-USGS)
W73-10039

DISTRIBUTION OF THE COREY SHAPE FACTOR IN THE NEARSHORE ZONE,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
D. Poche, A. Jones, and B. Taylor.
Southeastern Geology, Vol 15, No 1, p 29-36, April 1973. 4 fig, 2 tab, 10 ref.

Descriptors: *Particle shape, *Sands, *Settling velocity, Surf, Beaches, Alluvium, Sedimentology, Distribution patterns.
Identifiers: Shape factor (Sands).

The Corey shape factor for several thousand sand grains sampled from the nearshore zone had a mean value of 0.66. This is lower than the previously assumed value of 0.70 which is commonly used for rapid sediment analysis. This difference could cause about 5% error in the estimation of the nominal size of any sand sample. Comparison with the shape factors of river sands indicate no significant differences between surf abrasion and fluvial abrasion for particles of sand size. Histograms of the data are presented. (Knapp-USGS)
W73-10040

A MARKOV MODEL FOR BEACH PROFILE CHANGES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
C. J. Sonu, and W. R. James.
Journal of Geophysical Research, Vol 78, No 9, p 1462-1471, March 20, 1973. 6 fig, 3 tab, 9 ref. NR 388002. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Statistical models, *Mathematical models, *Beach erosion, *Markov processes, Numerical analysis, Simulation analysis, Profiles, Beaches, Sedimentation, Geomorphology, Waves (Water), Surf, Probability.
Identifiers: *Beach profiles.

The history of beach geometry can be modeled as a specific case of first-order Markov process. Under the assumptions that the profile transition is controlled only by random excitations from waves and that the transition probability is identical for all the possible states of beach profile, it is demonstrated that a beach profile time series contains cycles having negative binomial distribution. A simplified case in which the transition probability is taken as one-half (i.e., equal probability for either erosional or accretional transition for any profile state) is derived through both numerical simulation and theoretical derivation. The result shows reasonable agreement with field observations. (Knapp-USGS)
W73-10043

A MODEL FOR FORMATION OF TRANSVERSE BARS,
Florida State Univ., Tallahassee. Geophysical Fluid Dynamics Inst.
A. I. Barcilon, and J. P. Lau.
Journal of Geophysical Research, Vol 78, No 15, p 2656-2664, May 20, 1973. 4 fig, 3 tab, 22 ref. ONR N-00014-68-0159, NOAA NG-3-72.

Descriptors: *Sand bars, *Sand waves, *Beaches, *Sediment transport, Mathematical models, Sedimentary structure, Hydraulic models, Surf, Beach erosion, Dunes, Ripple marks, Littoral drift, Currents (Water).

Subtle rhythmic transverse bars more or less normal to the beach are distinct features of low-energy beaches. A simple theoretical model accounts for the formation of these bars. Linearized potential flow equations, an empirical formula for the bed load discharge, a continuity equation for the sediment, and the artifice of the lag distance between fluid and bed waves are used to formulate the model. The resulting loose boundary instability mechanism is interpreted as being related to transverse sand bar formation. Although in nature the transverse bars are not perpendicular to the coast and the currents do not run parallel to the shore as they do in the model, an estimate can be made of the spacing between transverse bars. Field observations for five locations are compared with model results. Sustained longshore currents are responsible for transverse sand bar formation. The spacing between the bars depends on the inverse of the beach slope and on the squares of the drift velocity across the bars. (Knapp-USGS)
W73-10046

MODIFICATIONS IN THE SOLUBILITY AND PRECIPITATION BEHAVIOR OF VARIOUS METALS AS A RESULT OF THEIR INTERACTION WITH SEDIMENTARY HUMIC ACID,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Geoscience Center.
For primary bibliographic entry see Field 02K.
W73-10062

PROVENANCE AND ACCUMULATION RATES OF OPALINE SILICA, AL, TI, FE, CU, MN, NI, AND CO IN PACIFIC PELAGIC SEDIMENTS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
K. Bostrom, T. Kraemer, and S. Gartner.
Chemical Geology, Vol 11, No 2, p 123-148, April 1973. 19 fig, 3 tab, 68 ref.

Descriptors: *Bottom sediments, *Pacific Ocean, *Provenance, *Silica, *Trace elements, Aluminum, Titanium, Iron, Manganese, Copper, Nickel, Cobalt, Water chemistry, Weathering, Volcanoes, Sediment transport, Sedimentation.

Accumulation rates and chemical compositions of pelagic sediments were studied at 73 locations in the Pacific Ocean and 11 in the Indian Ocean. In the Pacific, many elements accumulate rapidly close to the continents and slowly in the central part of the ocean. This pattern is interrupted by two major zones of relatively high accumulation rates, one along the Equator and one along the East Pacific Rise. Deposition of opaline silica is almost completely restricted to areas of high biological productivities at the Equator and at very high latitudes. Cu and Ni show stronger tendencies than Fe and Mn to precipitate with opaline silica. The highest accumulation rates of Fe and Mn in the open Pacific occur along the East Pacific Rise. To some extent Cu and Ni are enriched there due to volcanic processes. Al and Ti show high accumulation rates only close to the continents; these elements appear to be almost completely terrigenous. Significant quantities of basaltic matter (oceanic crust) are incorporated into the sediments only in areas of very low total sedimentation rates in the vicinity of oceanic island groups such as Polynesia and Hawaii, whereas hydrothermal processes act as a major sediment source only on the East Pacific Rise. Sediments in the north as well as in the southernmost part of the Pacific are nearly entirely terrigenous. Between 75% and 95% of all sediments in the Pacific are terrigenous, and submarine weathering and submarine exhalations each account for only a small fraction of the sediments. (Knapp-USGS)
W73-10063

ALPHA-RECOIL THORIUM-234: DISSOLUTION INTO WATER AND THE URANIUM-234/URANIUM-238 DISEQUILIBRIUM IN NATURE,
Gakushuin Univ., Tokyo (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 05B.
W73-10325

THE DISCHARGE/WAVE-POWER CLIMATE AND THE MORPHOLOGY OF DELTA COASTS,
Louisiana State Univ., New Orleans.
For primary bibliographic entry see Field 02L.
W73-10334

2K. Chemical Processes

KINETICS OF CARBONATE-SEAWATER INTERACTIONS,
Hawaii Inst. of Geophysics, Honolulu.
F. Pesret.
Available from NTIS, Springfield, Va., 22151, as AD-747 979; Price $3.00 printed copy; $0.95 microfiche. Hawaii Institute of Geophysics Report HIG-72-10, August 1972. 64 p, 14 fig, 30 ref, 3 append. ONR Contract N00014-70-A-0016-0001.

Descriptors: *Water chemistry, *Sea water, *Calcite, Solubility, Aqueous solutions, Chemical properties, Analytical techniques, Correlation analysis, Organic matter, Dissolved solids, Magnesium, Strontium, Calcium, Sulfates, Phosphates.

Most of the calcium carbonate removed from the oceans is precipitated out by pelagic organisms living in the upper layers of the world's oceans. However, only a small fraction of that amount accumulates on the ocean floor as sediments. Thus, there is the question of where the dissolution takes place. Using the spinning disk method, an experimental setup was devised to study the rate of dissolution of calcite in aqueous solutions. Different models were developed to describe the reaction and to estimate what chemical processes may take place. The object of this study was to compare the relative influence of individual seawater constituents such as Mg, Sr, Ba, Ca, SO4, PO4 and dissolved organic matter, on the rate of calcite solution. The effect of temperature was studied by the same method. Calcium ions, followed by magnesium ions and dissolved organic matter, were found to have the greater influence on the solution-rate constant. (Woodard-USGS)
W73-09790

GROUNDWATER CONSITIONS IN THE CENTRAL VIRGIN RIVER BASIN, UTAH,
Geological Survey, Salt Lake City, Utah.
For primary bibliographic entry see Field 04B.
W73-09791

GROUNDWATER RESOURCES OF MOTLEY AND NORTHEASTERN FLOYD COUNTIES, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-09792

GROUNDWATER RESOURCES OF HALL AND EASTERN BRISCO COUNTIES, TEXAS.
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04B.
W73-09793

HYDROCHEMICAL TYPING OF RIVER BASINS OF THE UKRAINE,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 05B.
W73-09811

DETERMINATION OF THE TOTAL AMOUNT OF CARBOHYDRATES IN OCEAN SEDIMENTS,
For primary bibliographic entry see Field 05A.
W73-09884

DETERMINATION OF TRACES OF IRON, COBALT AND TITANIUM IN SEA WATER AND SUSPENDED MATTER (IN SAMPLES FROM THE BALTIC SEA AND ATLANTIC OCEAN),
For primary bibliographic entry see Field 05A.
W73-09895

A GUIDE TO MARINE POLLUTION.
For primary bibliographic entry see Field 05A.
W73-09915

OBSERVATIONS ON MESOZOIC SANDSTONE AQUIFERS IN SAUDI ARABIA,
Ministry of Agriculture and Water, Riyadh (Saudi Arabia).
For primary bibliographic entry see Field 02F.
W73-09949

PROPERTIES AND MANIFESTATIONS OF REGIONAL GROUNDWATER MOVEMENT,
Research Council of Alberta, Edmonton.
For primary bibliographic entry see Field 02F.
W73-09959

GEOCHEMICAL PROCESSES IN SHALLOW GROUNDWATER FLOW SYSTEMS IN FIVE AREAS IN SOUTHERN MANITOBA, CANADA,
Waterloo Univ. (Ontario). Dept. of Earth Sciences.
For primary bibliographic entry see Field 02F.
W73-09964

A PRELIMINARY STUDY OF THE GEOCHEMICAL CHARACTERISTICS OF THERMAL WATERS IN NEW MEXICO,
New Mexico Inst. of Mining and Technology, Socorro.
For primary bibliographic entry see Field 02F.
W73-09967

REACTIONS OF THE MONOCALCIUM PHOSPHATE MONOHYDRATE AND ANHYDROUS DIACALCIUM PHOSPHATE OF VOLCANIC SOILS, (IN SPANISH),
Chile Univ., Santiago.
For primary bibliographic entry see Field 02G.
W73-09982

CHARACTERISTICS OF DISTRIBUTION OF FLUORINE IN WATERS OF THE STEPPE REGIONS OF KAZAKHSTAN IN RELATION TO ENDEMIC FLUOROSIS, (IN RUSSIAN),
For primary bibliographic entry see Field 05B.
W73-09990

INTERNAL WATERS: MONOGRAPHS FROM LIMNOLOGY AND NEIGHBORING AREAS, VOL. 25. BIOLOGY OF BRACKISH WATER,
A. Remane, and C. Schlieper.
E. Schweizerbart'sche Verlagsbuchhandlung (Naegele u. Obermiller): Stuttgart, West Germany; John Wiley and Sons, Inc: New York, N.Y., 2nd Revised Ed. 372 p, Illus, Maps. 1971. Pr. $21.75.
Identifiers: Animals, Biotopes, Books, *Brackish water, Distribution, *Limnology, Monographs, Organisms, Salinity.

This book represents the translation of the 1958 German publication on brackish water; it has been completely revised and covers a much broader field of knowledge. The book confines its presentation to the important ecological features peculiar to the region of brackish water and the problems they pose, emphasizing the brackish waters of the region of Central Europe and the Baltic Sea. The book is divided into 2 major divisions. The first section covers the following areas: salinity as a factor in the distribution of animals and definitions of brackish water; special ecological features of brackish water organisms; brackish water as an area of colonization of freshwater and marine organisms and specific habitat of brackish-water organisms; the biotopes in brackish water; and types of brackish water. Section 2 covers the following aspects of the physiological features of life in brackish water: salinity ranges and osmotic resistance; rate of activity and activity changes; volume and regulation of volume; osmotic concentration of the internal medium and osmoregulation; permeability of the integument; effects of temperature and temperature resistance; ionic effects in balanced and non-balanced brackish water; and tables of the ionic composition of sea and brackish water. Numerous illustrations and tables are included and each chapter ends with a list of references. The book ends with subject and author indexes and an index of genera.--Copyright 1972, Biological Abstracts, Inc.
W73-10006

COMPUTATION OF SALINITY AND TEMPERATURE FIELDS IN RIVER MOUTHS NEAR THE SEA (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
I. L. Vulis, and Yu. V. Masolov.
Okeanologiya, Vol 12, No 1, p 158-161, 1972, Illus, English summary.
Identifiers: Computation, *River mouths, *Salinity, Seas, *Water temperature.

Salinity and temperature distribution in the sea areas near river mouths is discussed. The computation method is based on the laws governing the distribution of turbulent currents. The distribution of salinity concentrations and temperature along the current axis is computed for the self-modeling part of the current, and the computation results are compared with experimental data.--Copyright 1972, Biological Abstracts, Inc.
W73-10009

ECOPHYSIOLOGICAL STUDIES ON HEAVY METAL PLANTS IN SOUTHERN CENTRAL AFRICA,
Munester Univ. (West Germany).
For primary bibliographic entry see Field 02I.
W73-10012

CHEMICAL EFFECTS OF PORE FLUIDS ON ROCK PROPERTIES,
Texas A and M Univ., College Station. Coll. of Geosciences.
H. S. Swolfs.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 224-234, 1972. 12 fig, 3 tab, 42 ref.

Descriptors: *Subsurface waste disposal, *Water pollution effects, *Hydrogeology, *Aquifer characteristics, *Rock porperties, Strength, Earthquakes, Mechanical properties, Corrosion, Compaction, Waste disposal wells, Injection wells.

Disposal of waste fluids into the subsurface may affect the mechanical properties and strength of the rock mass in two important ways. When fluid is chemically inert, strength and ductility are reduced by increasing pore pressure. When fluid is chemically active, the strength of the rock mass is further reduced through modification of the cohesive strength of its constituent grains in contact with the fluid. The strength of rocks and propagation of minute surface cracks are highly dependent

on the moisture content of the rock. Dilute solutions of aluminum and ferric iron salts, in addition to water, react with the surface structure of quartz and silicates and weaken the surface silicon-oxygen bonds by hydrolysis. The result is a reduction in surface energy, surface cohesion, and breaking strength. The frictional characteristics of rocks may be significantly altered by the introduction of chemically active fluids. Man made earthquakes near Denver and Rangely, Colorado, show that tests of rock properties should be made, particularly regarding the influence of pore-fluid pressure and chemistry, if problems caused by unexpected rock failure are to be eliminated. (Knapp-USGS)
W73-10029

WATER-MINERAL REACTIONS RELATED TO POTENTIAL FLUID-INJECTION PROBLEMS,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 05B.
W73-10034

NATURAL-MEMBRANE PHENOMENA AND SUBSURFACE WASTE EMPLACEMENT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10035

GEOCHEMICAL EFFECTS AND MOVEMENT OF INJECTED INDUSTRIAL WASTE IN A LIMESTONE AQUIFER,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W73-10036

THE EFFECT OF HYDROLOGIC FACTORS ON THE PORE WATER CHEMISTRY OF INTERTIDAL MARSH SEDIMENTS,
South Carolina Univ., Columbia. Dept. of Geology.
L. R. Gardner.
Southeastern Geology, Vol 15, No 1, p 17-28, April 1973. 6 fig, 1 tab, 6 ref.

Descriptors: *Water chemistry, *Pore water, *Intertidal areas, *Marshes, Oxidation-reduction potential, Hydrogen ion concentration, Alkalinity, Salinity, Sulfates, Sulfides, Hydrogeology, Water level fluctuations.

Near Georgetown, South Carolina, three hydrogeochemical settings play a role in determining the chemical parameters of interstitial waters in the intertidal marsh environment. In areas of the marsh remote from both tidal creeks and sources of fresh groundwater, pore waters are hydraulically stagnant and characterized by high alkalinity, low pS, and moderate pH. Adjacent to sources of fresh groundwater the salinity and pH decrease but the ratio of SO4 to C1 rises. These marginal areas are sandy sediment which is probably well ventilated. The chemistry of these areas appears to be controlled by the oxidation of sulfide to sulfate. Interstitial waters along the banks and margins of tidal creeks are marked by high pH, low alkalinity, normal salinity, and normal ratios of SO4 to C1. Such areas are hydraulically active settings where fresh seawater infiltrates at high tide, mixes with more reduced waters and subsequently drains at low tide. (Knapp-USGS)
W73-10041

IN SITU DISSOLVED OXYGEN MEASUREMENTS IN THE NORTH AND WEST ATLANTIC OCEAN,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
For primary bibliographic entry see Field 05A.
W73-10042

INTERSTITIAL WATER CHEMISTRY AND AQUIFER PROPERTIES IN THE UPPER AND MIDDLE CHALK OF BERKSHIRE, ENGLAND,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
W. M. Edmunds, P. E. R. Lovelock, and D. A. Gray.
Journal of Hydrology, Vol 19, No 1, p 21-31, May 1973. 4 fig, 1 tab, 15 ref.

Descriptors: *Pore water, *Water chemistry, *Limestones, *Hydrogeology, Aquifer characteristics, Weathering, Diagenesis, Fracture permeability, Groundwater movement.
Identifiers: *Chalk formation (England).

Interstitial water from core material from the Chalk of southern England has a variable chemical composition and is more mineralized by as much as a factor of 10 compared with the water from fissures samples in the borehole column. Measurements of porosity and permeability of the Chalk in the same core material show that there is a correlation between the physical and chemical parameters. The mineralized interstitial water in the lower zone may well represent pore water modified considerably since the Cretaceous by dilution with meteoric water, and the composition appears to have been influenced by diagenetic changes in the Chalk itself. The increase in the total mineralization appears to be associated with a decrease in the intrinsic permeability and porosity of the formation, suggesting that the rate of mass transfer is directly related to physical properties of the Chalk. The interstitial water composition in the upper zone of the borehole is more difficult to explain, particularly because there appears to be no correlation with changes in physical properties. The base exchange reactions which appear to have occurred in this zone are probably related to processes operating prior to any development pumping. The chemical composition may somehow be related to the former presence of Tertiary cover. Reading Beds of Eocene age occur at the surface within a few hundred meters of the site, and the abnormal compositions found in the upper zone may be related to migration of sodium rich waters derived from the overlying formations before erosion led to the exposure of the Chalk. (Knapp-USGS)
W73-10060

MODIFICATIONS IN THE SOLUBILITY AND PRECIPITATION BEHAVIOR OF VARIOUS METALS AS A RESULT OF THEIR INTERACTION WITH SEDIMENTARY HUMIC ACID,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Geoscience Center.
M. A. Rashid, and J. D. Leonard.
Chemical Geology, Vol 11, No 2, p 89-97, April 1973. 2 fig, 4 tab, 15 ref.

Descriptors: *Humic acids, *Water chemistry, *Chelation, Leaching, Sedimentation, Chemical precipitation, Weathering, Diagenesis, Solubility.

Sedimentary humic acid or its acid-hydrolysate, consisting of various amino acids, is effective in dissolving unusually large quantities of metals (up to 682 mg/g of organic matter) from their insoluble salts. The presence of humic acid in a reaction media which had favorable conditions for the precipitation of metals as carbonates, hydroxides or sulfides prevented the formation of insoluble metal salts. Infrared analysis suggests that the metals added to various anionic systems and humic acid do not react with the anion, but apparently a complex formation between metals and organic matter keeps the metal in solution. The enhanced solubility and consequent decrease in precipitation of metals under the influence of humic compounds plays a leading role in the accumulation of metals in sedimentary deposits. (Knapp-USGS)
W73-10062

PROVENANCE AND ACCUMULATION RATES OF OPALINE SILICA, AL, TI, FE, CU, MN, NI, AND CO IN PACIFIC PELAGIC SEDIMENTS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
For primary bibliographic entry see Field 02J.
W73-10063

A FUNDAMENTAL STUDY OF THE SORPTION FROM TRICHLOROETHYLENE OF THREE DISPERSE DYES ON POLYESTER,
Auburn Univ., Ala. Dept. of Textile Engineering.
For primary bibliographic entry see Field 03E.
W73-10151

DIFFUSION IN COMPLEX SYSTEMS,
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
G. E. Spalding.
Available from NTIS, Springfield, Va., as ORO-695; $5.45 in paper copy, $0.95 in microfiche. In: Report ORO-695, p 71-73. July 1972.

Descriptors: *Soil chemistry, *Diffusion, *Ion transport, *Computer programs, Numerical analysis, Electrodialysis, Electrolytes, Equations, Cation exchange, Soil-water-plant relationships, Path of pollutant.

A computer program was developed which will numerically solve a set of time-dependent Nernst-Planck equations and thus predict the rates and paths of diffusion when only self-diffusion coefficients are known. The program was written for 3 mobile ionic species and simultaneously solves 2 nonlinear second-order partial differential equations. Initial and boundary conditions can be changed. For (1) the interdiffusion of NaCl and Sr (Cl)2 in aqueous solution and (2) the exchange between a H (+) saturated phenosulfonic membrane and NaCl solution predictions agreed with experiment generally; however systematic deviations suggested that the electric field is reduced by ion-pair formation. (Bopp-ORNL)
W73-10183

POTENTIALITIES AND LIMITS OF MULTIELEMENT NEUTRON ACTIVATION ANALYSIS OF BIOLOGICAL SPECIMENS WITH OR WITHOUT SEPARATION FROM AN ACTIVE MATRICE, (POSSIBILITIES ET LIMITES DE L'ANALYSE PAR ACTIVATION NEUTRONIQUE MULTIELE MENTAIRE D'ECHANTILLONS BIOLOGIQUES AVEC OU SANS SEPARATION DE LA MATRICE ACTIVABLE.),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 05A.
W73-10184

SYSTEMS ANALYSIS OF MINERAL CYCLING IN FOREST ECOSYSTEMS,
Goettingen Univ. (West Germany).
B. Ulrich, and R. Mayer.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec. 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 329-339. 1 tab, 2 fig, 16 ref.

Descriptors: *Deciduous forests, *Radioecology, *Soil-water-plant relationships, *Tracers, Balance of nature, Cycling nutrients, Ecology, Soil moisture meters, Moisture uptake, Root zone, Transpiration, Radioactivity techniques, Nitrogen cycle, Radioecology, Soil science.

Use of radioisotopes for answering questions in systems analysis of mineral cycling is described briefly. Bioelement fluxes (H, Na, K, Ca, Mg, Fe, Mn, Al, N, P, S, Cl) for a 125-year-old beech stand were measured: (1) input into the ecosystem by

precipitation; (2)- (4) soil input by through-fall (by passage of rains through the tree crown), stem flow and litter, respectively; (5)- (7) output from the humus layer, from the intensive root layer in a 50-cm soil depth and from the extensive root layer in a 100-cm soil depth. From an annual balance of bioelement fluxes, information is drawn about the steady-state behavior of the ecosystem, plant uptake of bioelements, separation of plant uptake into mass flow and diffusion transport mechanisms, and ion-uptake selectivity. Transfer functions expressing the fluxes as functions of compartment inputs are derived from monthly flux balances. (See also W72-10679) (Bopp-ORNL)
W73-10188

USE OF TRITIATED WATER FOR DETERMINATION OF PLANT TRANSPIRATION AND BIOMASS UNDER FIELD CONDITIONS,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 02D.
W73-10190

MOVEMENT OF ZN65 INTO SOILS FROM SURFACE APPLICATION OF ZN SULPHATE IN COLUMNS,
Haile Sellassie I Univ., Alem Maya (Ethiopia). Coll. of Agriculture.
For primary bibliographic entry see Field 02G.
W73-10191

BEHAVIOUR OF RU IN AN ESTABLISHED PASTURE SOIL AND ITS UPTAKE BY GRASSES,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
For primary bibliographic entry see Field 05B.
W73-10192

GEOTHERMAL WATER AND POWER RESOURCE EXPLORATION AND DEVELOPMENT FOR IDAHO,
Boise State Coll., Idaho. Dept. of Geology.
For primary bibliographic entry see Field 06B.
W73-10217

THE FLUXES OF MARINE CHEMISTRY,
Scripps Institution of Oceanography, La Jolla, Calif.
E. D. Goldberg.
Proceedings of the Royal Society of Edinburg. Section B: Biology, Vol 72, p 357-364, 1971/72. 21 ref.

Descriptors: *Oceans, Chemistry, *Wastes, Air-earth interfaces, *Air-water interfaces, *Earth-water interfaces, Transfer, Water pollution control.

The development of chemical oceanography as a scientific discipline is reviewed, and transfer of materials from oceans to continents to the atmosphere and back to continents is described. (Ensign-PAI)
W73-10225

PUBLIC WATER SUPPLIES OF SELECTED MUNICIPALITIES IN FLORIDA, 1970,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 04B.
W73-10319

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 02E.
W73-10321

NON-EQUILIBRIUM PHENOMENA IN CHEMICAL TRANSPORT BY GROUND-WATER FLOW SYSTEMS,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 05B.
W73-10329

VEGETATION OF PRAIRIE POTHOLES, NORTH DAKOTA, IN RELATION TO QUALITY OF WATER AND OTHER ENVIRONMENTAL FACTORS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02I.
W73-10330

GROUNDWATER QUALITY IN THE CORTARO AREA NORTHWEST OF TUCSON, ARIZONA,
For primary bibliographic entry see Field 05B.
W73-10332

RELATIVE LEACHING POTENTIALS ESTIMATED FROM HYDROLOGIC SOIL GROUPS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 02G.
W73-10333

TURBULENCE, MIXING AND GAS TRANSFER,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-10338

RELATIVE GAS TRANSFER CHARACTERISTICS OF KRYPTON AND OXYGEN,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-10339

FIELD TRACER PROCEDURES AND MATHEMATICAL BASIS,
For primary bibliographic entry see Field 05B.
W73-10340

LABORATORY PROCEDURES,
For primary bibliographic entry see Field 05B.
W73-10342

OXYGEN BALANCE OF THE SOUTH RIVER,
For primary bibliographic entry see Field 05B.
W73-10344

2L. Estuaries

PHYSICAL AND CHEMICAL PROPERTIES OF THE COASTAL WATERS OF GEORGIA,
Georgia Univ., Sapelo Island. Marine Inst.
R. Kuroda, and F. C. Marland.
Available from the National Technical Information Service as PB-220 680, $3.00 in paper copy, $0.95 in microfiche. Georgia Environmental Resources Center, Atlanta, Report ERC-0373, April 1973, 82 p 25 fig, 10 tab, 11 ref, append. OWRR B-035-GA (1). 14-0001-1892.

Descriptors: *Ocean circulation, Ocean waves, Winds, *Salinity, *Conductivity, *Turbidity, *Dissolved oxygen, *Georgia, Sea water, Seasonal, Atlantic Ocean, Physicochemical properties, Estuaries.
Identifiers: *Sapelo Island (Georgia), Offshore waters, Ocean water masses.

Previously unpublished data are presented on the circulation and seasonal movements of the ocean waters, waves, and wind off the Georgia coast, especially in the vicinity of Sapelo Island. The total surface circulation was found to be strongly influenced by or at least coincident with prevailing winds. Analyses of the sea water for temperature, salinity, conductivity, acidity, turbidity, and dissolved oxygen content and for seasonal changes in these properties were used to classify the offshore waters. The consistent water masses were classified, proceeding from the open sea toward the coast, as North Atlantic Central Water, Mixing Water, Shelf Water, and Coastal Water. Each mass was mapped so that its seasonal movements and distributions could be traced. These original data on sea water conditions form a general benchmark for future investigations into the hydrographic conditions of the Georgia coast and a specific benchmark for a companion report on circulation within a Georgia Coastal Estuary. Good hydrographic information on an estuary is essential to effective water pollution control (James--Georgia Tech).
W73-09752

REPORT ON POLLUTION OF THE ST. MARYS AND AMELIA ESTUARIES, GEORGIA--FLORIDA,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05B.
W73-09788

GEOLOGIC PROCESS INVESTIGATIONS OF A BEACH-INLET-CHANNEL COMPLEX, NORTH INLET, SOUTH CAROLINA,
South Carolina Univ., Columbia. Dept. of Geology.
R. J. Finley.
Maritime Sediments, Vol 8, No 2, p 65-67, September 1972. 3 fig, 1 ref.

Descriptors: *Beaches, *Tidal waters, *Geomorphology, *South Carolina, *Marshes, Inlets (Waterways), Tides, Sediment transport, Beach erosion, Littoral drift, Sedimentary structures, Sand bars, Sand waves, Sand spits, Sedimentation.
Identifiers: *North Inlet (SC).

The coastal area adjacent to North Inlet, Georgetown County, South Carolina, was used in a study of short-term geological and geochemical variables because it is relatively unaffected by man's activities. Climatic factors, physical and chemical characteristics of the tidal prism, substrate composition, bedform morphology, and beach and inlet processes were investigated. The dominant drift is to the south. A northerly drift just south of the inlet may be the result of wave refraction around the ebbtidal delta. Mean tidal range at North Inlet is 1.4 m. No temperature or salinity stratification was found. There is no major freshwater influx to the tidal channels. Summer water temperatures ranged from 26.5 deg C to 29 deg C, and variations with depth up to 8 m rarely exceeded a few tenths of a degree Centigrade. The waters carry substantial suspended matter, both organic and inorganic. (Knapp-USGS)
W73-09795

COBEQUID BAY SEDIMENTOLOGY PROJECT: A PROGRESS REPORT,
McMaster Univ., Hamilton (Ontario). Dept. of Geology.
R. J. Knight.
Maritime Sediments, Vol 8, No 2, p 45-60, September 1972. 15 fig, 6 tab, 24 ref.

Descriptors: *Sedimentology, *Channel morphology, *Sand waves, *Tidal waters, *Ripple marks, Sediment transport, Tides, *Canada, Tidal effects, Tidal bores, Tidal streams.
Identifiers: *Bay of Fundy (Cobequid Bay).

Intertidal and deposits in Cobequid Bay, Nova Scotia, were studied as part of a field program begun in 1971 to study the mechanics of intertidal sedimentation. The field area is characterized by a mean semidiurnal tide range of 11.5 m with a maximum spring tidal range of approximately 17 m. A tidal range of this magnitude and frequency permits the observation of the sediment responses produced during ebb-flow periods and consequent emergence which are normally inaccessible in other coastal areas due to water depth. A bedform hierarchy is related to increasing current velocities. The variety of bedorms on Selmah Bar appears to be a function of the complex topographic relationships, grain size, and exposure to the various processes active on the sand bar. The occurrence of ebb-oriented bedforms low tide is not necessarily conclusive evidence for ebb dominance. Orientations of megaripple and sandwave crestline appear to be controlled by the mean current direction. Small scale ripple-crest orientations appear to be controlled by the local shallow-water flow conditions. The magnitude of current velocities and the degree of time-velocity asymmetry is a function of location, point in the lunar-tide cycle, and water surface slopes. Irregularities in velocity profiles and directional data suggest the presence of turbulence. Tidal currents appear to be the most important agent in the transport of sediment in the intertidal environment. (Knapp-USGS)
W73-09796

THE COASTAL GEOMORPHOLOGY OF THE SOUTHERN GULF OF SAINT LAWRENCE: A RECONNAISSANCE,
South Carolina Univ., Columbia. Dept. of Geology.
E. H. Owens, and J. R. Harper.
Maritime Sediments, Vol 8, No 2, p 61-64, September 1972. 2 fig, 1 tab, 2 ref.

Descriptors: *Beaches, *Beach erosion, *Geomorphology, *Coasts, *Canada, Currents (Water), Waves (Water), Littoral drift, Sand bars, Sand spits, Shores, Topography.
Identifiers: *Coastal geomorphology, *Gulf of St. Lawrence.

Rapid reconnaissance of coastal morphology and littoral sediments was used in the southern Gulf of St. Lawrence during the summer of 1972 to define and analyze the major characteristics of 2500-km section of coast and to describe and explain variations in form and processes within the region. The reconnaissance provided basic data on the coastal geomorphology and the littoral processes and was used also as a framework for the delineation of particular problems for further detailed studies. In general, the southern Gulf may be divided into three broad shoreline types as follows: (1) resistant upland cliffed coasts, (2) barrier beaches, and (3) rapidly eroding low sandstone cliffs. Beaches are usually narrow, often reworked talus deposits, or pocket beaches located in areas where erosion has followed lines of structural weakness. The sediments are generally coarse with only occasional sand accumulations. The structural patterns are nearly perpendicular to the trend of the coast giving a series of large embayments partially closed by mid-bay bars. On Cape Breton Island the structure parallels the coast and the shore is straight with local irregularities resulting from secondary structural features. Barrier beach systems occur on the exposed coasts of eastern New Brunswick, northern Prince Edward Island, and the Magdalen Islands where large embayments have been closed off by the growth of depositional formations. The shorelines of Northunberland Strait are a separate and distinct unit due to the very short fetches and the higher tidal range. The area is characterized by unresistant cliffs, rock platforms, spits and intertidal swash bars. (Knapp-USGS)
W73-09797

COMPUTER SIMULATION OF GROUND WATER AQUIFERS OF THE COASTAL PLAIN OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 02F.
W73-09871

BARTOW MAINTENANCE DREDGING: AN ENVIRONMENTAL APPROACH,
For primary bibliographic entry see Field 05G.
W73-09881

HYDRAULIC MODELS PREDICT ENVIRONMENTAL EFFECTS.
For primary bibliographic entry see Field 08B.
W73-09883

DEVELOPMENT PROPOSAL FOR LAGOONS,
Rhode Island Univ., Kingston. Dept. of Economics.
For primary bibliographic entry see Field 03C.
W73-09886

ARTIFICIAL RADIOACTIVITY IN FRESH WATER AND ESTUARINE SYSTEMS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05B.
W73-09893

SEDIMENTARY PHOSPHORUS IN THE PAMLICO ESTUARY OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05B.
W73-09897

STUDIES ON THE COASTAL OCEANOGRAPHY IN THE VICINITY OF FUKUYAMA, HIROSHIMA PREF., I. DISTRIBUTION PATTERNS OF TEMPERATURE, CHLORINITY, PH AND INORGANIC NUTRIENT (PHOSPHATE-P, AMMONIA-N, NITRITE-N, NITRATE-N) CONTENTS OF SEA WATER IN EARLY FEBRUARY, 1968, (IN JAPANESE),
Hiroshima Univ. (Japan). Dept. of Fisheries.
For primary bibliographic entry see Field 05B.
W73-09899

NATURAL AND MANMADE HYDROCARBONS IN THE OCEANS,
Texas Univ., Port Aransas. Marine Science Inst.
For primary bibliographic entry see Field 05B.
W73-09907

THE KENT COAST IN 1971,
British Museum of Natural History, London. Marine Algal Section.
For primary bibliographic entry see Field 05C.
W73-09909

WASTE DISPOSAL AND WATER QUALITY IN THE ESTUARIES OF NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-09911

COAGULATION IN ESTUARIES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. K. Edzwald.
Sea Grant Publication UNC-SG-72-06, July 1972. 204 p. 37 fig, 25 tab, 131 fig, 4 append.

Descriptors: *Coagulation, *Flocculation, *Estuaries, Clay minerals, Sediments, Kaolinite, Illite, Montmorillonite, *North Carolina.
Identifiers: *Pamlico Estuary (NC).

A model in which the stability of clay minerals is dependent on the chemistry of the system is proposed and tested. It is assumed that clay suspensions are destabilized by compression of the electrical double layer when these suspensions are transported from fresh waters into estuaries. The stability factor of three clay minerals was determined in the laboratory in solutions at various ionic strengths. Illite was found more stable than Kaolinite and this more stable than Montmorillonite. Particle destabilization increased with salinity; it similarly improved when solutions with divalent cations were used instead of solutions with monovalent solutions. Selected sediments from the Pamlico Estuary of North Carolina were studied, their composition being determined by x-ray difraction. Kaolinite was abundant in the upper estuary and decreased towards the mouth, Illite increased towards the mouth and Montmorillonite was found in minor amounts, the rest comprised chlorite and chlorite-like intergrade clay. The stability factor decreased downstream. The coagulation and deposition of clays in estuaries can affect water quality via adsorption and release of soluble pollutants. It is concluded from adsorbed phosphorus data that sediments entering the estuary from upstream would lose phosphorus as salinity increases. Depending upon the strength of the solid-solute interaction, coagulated materials could serve as a source or sink for a soluble substance in estuarine waters. (Ensign-PAI)
W73-09925

TIDAL FLUCTUATIONS IN A CONFINED AQUIFER EXTENDING UNDER THE SEA,
Vrije Universiteit, Amsterdam (Netherlands). Inst. of Earth Sciences.
For primary bibliographic entry see Field 02F.
W73-09955

RIVER THAMES--REMOVABLE FLOOD BARRIERS,
Bruce White, Wolfe Barry and Partners, London (England).
For primary bibliographic entry see Field 08A.
W73-09996

SILTATION PROBLEMS IN RELATION TO THE THAMES BARRIER,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 08A.
W73-09997

POLLUTION PROBLEMS IN RELATION TO THE THAMES BARRIER,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 08A.
W73-09998

INTERNAL WATERS: MONOGRAPHS FROM LIMNOLOGY AND NEIGHBORING AREAS, VOL. 25. BIOLOGY OF BRACKISH WATER,
For primary bibliographic entry see Field 02K.
W73-10006

COMPUTATION OF SALINITY AND TEMPERATURE FIELDS IN RIVER MOUTHS NEAR THE SEA (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
For primary bibliographic entry see Field 02K.
W73-10009

GEOMETRY OF SANDSTONE RESERVOIR BODIES,
Shell Oil Co., Houston, Tex.
For primary bibliographic entry see Field 02F.
W73-10026

DISTRIBUTION OF THE COREY SHAPE FACTOR IN THE NEARSHORE ZONE,
Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
For primary bibliographic entry see Field 02J.
W73-10040

THE EFFECT OF HYDROLOGIC FACTORS ON THE PORE WATER CHEMISTRY OF INTERTIDAL MARSH SEDIMENTS,
South Carolina Univ., Columbia. Dept. of Geology.
For primary bibliographic entry see Field 02K.
W73-10041

RECENT SUBSIDENCE RATES ALONG THE TEXAS AND LOUISIANA COASTS AS DETERMINED FROM TIDE MEASUREMENTS,
National Ocean Survey, Rockville, Md.
R. L. Swanson, and C. I. Thurlow.
Journal of Geophysical Research, Vol 78, No 15, p 2665-2671, May 20, 1973. 3 fig, 3 tab, 11 ref.

Descriptors: *Subsidence, *Land subsidence, *Gulf Coastal Plain, *Texas, *Louisiana, Sedimentation, Withdrawal, Structural geology, Sea level, Surveys.

Sea level and tide level rose at several locations along the Louisiana and Texas coasts during the years 1959-1970, from as little as 0.5 cm/yr at Port Isabel, Texas, to a maximum of 4.3 cm/yr at South Pass, Louisiana. These rates were determined by comparing tide records along the Louisiana and Texas coasts with the long term tide record at Pensacola, Florida, a location assumed to be stable for the purpose of this study. At locations for which observations were available before 1959 the rise in sea (or tide) level was greater from 1959 to 1970 than during the decade prior to 1959. This rise in sea level is attributed to land subsidence. Subsidence in deltaic regions of the Mississippi River is related to combinations of geosynclinal downwarping, compaction of pore spaces by increased sediment burden, and lateral displacement by plastic flow of fine-grained sediments. West Bay has undergone subsidence caused by faulting and withdrawal of oil and water. Subsidence at Freeport is believed to reflect the deltaic environment of the Brazos River. The data were collected in the old river outlet that was abandoned in favor of a dredged channel in the 1930's. Since then the delta at the old outlet has receded. Consequences of withdrawal of oil and water from coastal substrata must also be considered. (Knapp-USGS)
W73-10045

PROBLEMS IN HYDROLOGY OF ESTUARINE REACHES OF SIBERIAN RIVERS (PROBLEMY GIDROLOGII UST'YEVYKH OBLASTEY SIBIRSKIKH REK).
Arkticheskii i Antarkticheskii Nauchno-Issledovatelskiy Institut, Leningrad (USSR).

Arkticheskiy i Antarkticheskiy Nauchno-Issledovatel 'skiy Institut Trudy, No 297, V. S. Antonov, editor, Leningrad, 1972. 147 p.

Descriptors: *Hydrology, *Estuaries, *Rivers, *Arctic, *Ice, Ice jams, Ice breakup, Melting, Snow, Discharge (Water), Runoff, Flow, Water levels, Water level fluctuations, Navigation, Hydrography, Mapping, Measurement, Instrumentation, Forecasting.
Identifiers: *USSR, *Siberia, Bars (Coastal).

Hydrologic and ice regimes of lower reaches and estuaries of major Siberian rivers are investigated in this collection of 15 papers published by the Arctic and Antarctic Scientific Research Institute. Specific topics include: (1) hydrologic regime of lower reaches of the Yenisey after regulation of flow; (2) computation of unsteady flow in estuaries of large Siberian rivers; (3) long-range forecasts of water levels on the Kolyma River bar; (4) melting of ice cover in arctic river mouths; (5) flow of Ob' River water into the sea and long-term variability of runoff; (6) water-level fluctuations of the Pur River; (7) runoff redistribution in the Yenisey delta; (8) distribution of spring ice jams on rivers in the Siberian Arctic; (9) effect of ice jams on breakup of ice cover at the mouth of the Yenisey; (10) a new map of drainage density for the Lena River basin; and (11) water-level measurements in river mouths by the compensation method. (Josefson-USGS)
W73-10053

PROBLEMS OF SUBSURFACE FLOW INTO SEAS (PROBLEMA PODZEMNOGO STOKA V MORYA),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 02F.
W73-10055

COASTAL ZONE POLLUTION MANAGEMENT, PROCEEDINGS OF THE SYMPOSIUM.
For primary bibliographic entry see Field 05G.
W73-10098

APPLICATIONS OF ESTUARINE WATER QUALITY MODELS,
Manhattan Coll., Bronx, N.Y.
For primary bibliographic entry see Field 05B.
W73-10108

EFFECT OF POLLUTION ON THE MARINE ENVIRONMENT, A CASE STUDY,
Florida State Univ., Tallahassee. Marine Lab.
For primary bibliographic entry see Field 05C.
W73-10110

NUMERICAL MODEL FOR THE PREDICTION OF TRANSIENT WATER QUALITY IN ESTUARY NETWORKS,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 05B.
W73-10112

ESTUARIES AND INDUSTRY,
University of Strathclyde, Garelochhead (Scotland). Marine Lab.
For primary bibliographic entry see Field 05B.
W73-10133

STUDIES ON THE WATER POLLUTION AND PRODUCTIVITY IN KYONGGI BAY IN SUMMER SEASON (3): CLASSIFICATION OF THE PHYTOPLANKTON (III), (IN KOREAN),
Seoul National Univ. (Republic of Korea). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-10159

EFFECTS OF SR90 (Y90), ZN65, AND CR51 ON THE LARVAE OF THE PACIFIC OYSTER CRASSOSTREA GIGAS,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 05C.
W73-10172

BIOENVIRONMENTAL FEATURES: AN OVERVIEW.
National Marine Fisheries Service, Seattle, Wash.
For primary bibliographic entry see Field 05B.
W73-10174

RESEARCH ON THE MARINE FOOD CHAIN, PROGRESS REPORT JULY 1971-JUNE 1972.
California Univ., San Diego, La Jolla. Inst. of Marine Resources.
For primary bibliographic entry see Field 05C.
W73-10200

AQUATIC RADIOLOGICAL ASSESSMENTS AT NUCLEAR POWER PLANTS,
Portland General Electric Co., Oreg.
For primary bibliographic entry see Field 05B.
W73-10204

MARINE RESOURCE DEVELOPMENT, A BLUEPRINT BY CITIZENS FOR THE NORTHEAST PACIFIC.
Washington Univ., Seattle. Div. of Marine Resources.
For primary bibliographic entry see Field 05G.
W73-10222

AIR FLOW LAND-SEA-AIR-INTERFACE: MONTEREY BAY, CALIFORNIA - 1971,
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 05B.
W73-10223

CURRENT STATUS OF RESEARCH ON THE BIOLOGICAL EFFECTS OF PESTICIDES IN CHESAPEAKE BAY,
Westinghouse Ocean Research Lab., Annapolis, Md.
For primary bibliographic entry see Field 05C.
W73-10231

CURRENT STATUS OF KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF HEAVY METALS IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Medicine.
For primary bibliographic entry see Field 05C.
W73-10232

CURRENT STATUS OF KNOWLEDGE CONCERNING THE CAUSE AND BIOLOGICAL EFFECTS OF EUTROPHICATION IN CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W73-10233

CURRENT STATUS OF THE KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS IN CHESAPEAKE BAY,
Maryland Univ., Prince Frederick, Hallowing Point Field Station.
For primary bibliographic entry see Field 05C.
W73-10234

BIOLOGICAL CRITERIA OF ENVIRONMENTAL CHANGE IN THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point. Dept. of Ecology-Pollution.
For primary bibliographic entry see Field 05B.
W73-10235

(BIOTA OF THE CHESAPEAKE BAY), CONCLUSIONS AND RECOMMENDATIONS,
Maryland Univ., Prince Frederick, Hallowing Point Field Station.
For primary bibliographic entry see Field 05B.
W73-10236

UPPER POTOMAC ESTUARY EUTROPHICATION CONTROL REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 05C.
W73-10247

TRACE METAL ENVIRONMENTS NEAR SHELL BANKS IN DELAWARE BAY,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 05B.
W73-10250

COASTAL ZONE MANAGEMENT: INTERGOVERNMENTAL RELATIONS AND LEGAL LIMITATIONS,
Maine Univ., Portland. School of Law.
For primary bibliographic entry see Field 06E.
W73-10254

REGULATION OF ACTIVITIES AFFECTING BAYS AND ESTUARIES: A PRELIMINARY LEGAL STUDY.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 06E.
W73-10256

SUMMARY OF SELECTED LEGISLATION RELATING TO THE COASTAL ZONE.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 06E.
W73-10257

GROUND WATER IN COASTAL GEORGIA,
Geological Survey, Atlanta, Ga.
For primary bibliographic entry see Field 04B.
W73-10326

THE DISCHARGE/WAVE-POWER CLIMATE AND THE MORPHOLOGY OF DELTA COASTS,
Louisiana State Univ., New Orleans.
L. D. Wright, and J. M. Coleman.
Proceedings of the Association of American Geographers, Vol 3, p 186-189, 1971. 11 ref.

Descriptors: *Deltas, *Geomorphology, *Coasts, *Sedimentology, Analytical techniques, Data collections, Computer models, Correlation analysis, Streamflow, Discharge (Water), Sediment transport, Sedimentation, Ocean waves, Waves (Water), Tidal effects, Shoals, Refraction (Water waves), Currents (Water), Topography.
Identifiers: *Delta morphologies.

The morphology of delta coasts can be partially attributed to opposition between the depositional tendencies of the river efflux and the marine wave-power regime. The discharge/wave-power climate of a delta may be described in terms of the magnitudes and spatiotemporal distributions of river discharge and wave power computed from hindcast deepwater wave characteristics. A FORTRAN IV computer program has been developed to facilitate the analyses taking into account the effects of refraction, shoaling, and frictional attenuation over varying subaqueous topographies. A comparison of two deltas indicated that morphologies reflect the discharge/wave-power climates. (Woodard-USGS)
W73-10334

SYMPOSIUM ON DIRECT TRACER MEASUREMENT OF THE REAERATION CAPACITY OF STREAMS AND ESTUARIES.
For primary bibliographic entry see Field 05B.
W73-10337

STUDY OF THE OCEANOGRAPHIC CONDITIONS IN THE RIA DE AROSA, IN SUMMER, (IN SPANISH),
Spanish Inst. of Oceanography, Madrid.
J. Gomez Gallego.
Bol Inst Esp Oceanogr. 147, p 1-39, 1971. Illus.
Identifiers: Oceanographic studies, *Ria-De-Arosa, Salinity, *Spain, Summer, Water temperature, *Dissolved oxygen.

The Ria de Arosa is an estuary in northwestern Spain between the provinces of La Coruna and Pontevedra. The sources of the water which it deposits into Atlantic Ocean are rain water and the outflow of the rivers Ulla and Umia. The study comprises statistical findings of temperatures, salinity, dissolved O2, phosphates and the direction and intensity of currents. Numerous maps and charts provide the results of the investigation, conducted at various stations and at various times, and depths. The thermal gradient is very high and reaches 1C/m on occasions. The currents are relatively weak. No reference is made to biological subjects.—Copyright 1973, Biological Abstracts, Inc.
W73-10363

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

WATER TREATMENT BY MEMBRANE ULTRAFILTRATION,
North Carolina State Univ., Raleigh. School of Engineering.
For primary bibliographic entry see Field 05D.
W73-09758

HEMIHYDRATE SCALING THRESHOLD ENHANCEMENT BY MAGNESIUM ION AUGMENTATION,
California Univ., Los Angeles. School of Engineering and Applied Science.
K. S. Murdia, J. Glater, and J. W. McCutchan.
California Water Resources Center Desalination Report No. 49, April 1972. 109 p, 18 fig, 29 tab, 42 ref, 2 append. OSW Contract 14-30-2785.

Descriptors: *Desalination, *Sea water, *Desalination processes, *Descaling, Water Chemistry, Chemical reactions, Methodology, Calcium compounds, Sulfates, Mixing, Additives, Magnesium, Chlorides, Ion exchange, Equipment, California.

Development of low cost water by distillation technology is severely limited by the deposition of mineral scale. Calcium sulfate scaling thresholds in natural seawater can be markedly enhanced by enrichment with magnesium chloride. The effect of magnesium ion on calcium sulfate solubility was studied in natural seawater concentrates. Experiments were carried out at magnesium concentrations up to 3 times the ambient level, concentration factors between 1 and 4, and temperatures up to 340 F. Equilibrium solubilities of hemihydrate were measured in teflon-lined pressure vessels under nonboiling, nonevaporating conditions. The effect of salinity and magnesium ion concentration on hemihydrate-anhydrite phase transition was also studied. This work carried out at temperatures and concentrations normally encountered in high temperature evaporators is most relevant to the scaling problem. A process for recovery of magnesium chloride from distilling plant blowdown is proposed. Sample calculation of material balances for this system are presented at varying levels of magnesium ion, blowdown concentrations and recycle ratios. (Woodard-USGS)
W73-09789

METHOD OF IMPROVING THE SALT REJECTION OF SEMIPERMEABLE REVERSE OSMOSIS MEMBRANES,
Westinghouse Electric Corp., Pittsburgh, Pa. (assignee).
R. R. Stana.
U.S. Patent No 3,721,623, 4 p, 1 fig, 1 tab, 1 ref; Official Gazette of the United States Patent Office, Vol 908, Nos 3, p 692, March 20, 1973.

Descriptors: *Patents, *Desalination, Membranes, *Semipermeable membranes, *Reverse osmosis, Separation techniques, Sea water, Potable water, Detergents, Additives.
Identifiers: Sodium phosphate, Alkyl sulfonates, Alkylaryl sulfonates.

To improve the salt rejection capability of a semipermeable reverse osmosis membrane, the membrane is treated with sodium phosphate and alkyl sulfonates and/or alkylaryl sulfonates. The detergent additive may be added to the feed liquid. One example is cited and results are tabulated. (Sinha-OEIS)
W73-09927

FORWARD-OSMOSIS SOLVENT EXTRACTION,
W. T. Hough.
U.S. Patent No 3, 721, 621, 4 p, 3 ref; Official Gazette of the United States Patent Office, Vol 908, No. 3, p 692, March 20, 1973.

Descriptors: *Patents, *Desalination, *Osmosis, *Membranes, *Filtration, Sea water, Potable water, Separatin techniques, Hydrogen ion concentration.

Pressure is applied to a quantity of seawater to facilitate the forward osmosis of the sea water in passing through a membrane having pores of maximum diameter. The water moves into a solution of more concentrated removable solute having a pH which may render the removable solute insoluble. The insoluble solute is then filtered and removed allowing the palatable water to be removed. Either an osmotic membrane or a non-osmotic membrane may be used, as long as the membrane is characterized by its microscopic pores. (Sinha-OEIS)
W73-09930

WATER HEATING AND PURIFICATION SYSTEM,
Pollution Research and Control Corp., Glendale, Calif. (Assignee).
A. V. Sims.
US Patent No 3,718,544, 6 p, 6 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 907, No 4, p 1033, February 27, 1973.

Descriptors: *Patents, *Water purification, *Distillation, *Condensation, *Heat exchangers, Water treatment.

An improved system is provided for supplying hot undistilled water together with distilled water employing a non-scale heat exchanger for condensation of water vapor. The apparatus comprises a vessel having an upper and lower portion. Water is heated in the lower portion. To minimize heat loss in the lower portion a coating or sheath of insulating material is sandwiched between the inner wall and the outer wall. The metal wall of the upper portion is not insulated to facilitate heat transfer. A glass or Teflon lining may be added to the wall in the upper portion to facilitate dropwise condensation while at the same time preventing corrosion. (Sinha-OEIS)
W73-09936

PARTICLE SEPARATOR AND METHOD,
For primary bibliographic entry see Field 05F.
W73-09937

DEVICE FOR RECLAIMING SWEET WATER FROM SEA WATER OR BRACKISH WATER,
Siemens A.G., Munich (West Germany). (Assignee).
K. Ruthrof.
US Patent No 3,717,554, 4 p, 3 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 907, No 3, p 780, February 20, 1973.

Descriptors: *Patents, *Desalination, *Vaporization, *Centrifugation, Sea water, Brackish water, Potable water, Separation techniques, Water treatment, *Water purification.

Sea water or brackish water is heated and fed into a centrifugal force field so that vaporization, due to low pressure occurring in a condenser located downstream of the centrifugal force field, takes place at the inner surface of a water ring formed by the centrifugal force field. The device comprises an outer stationary chamber and an inner chamber which is rotationally symmetrical. The gaseous medium is produced by vaporization in the inner chamber by means of an axial discharge device. The unwanted residue accumulates in the space between the two chambers and is led out by a special outlet tube. (Sinha-OEIS)
W73-09941

INVESTMENT SEQUENCING RECOGNIZING EXTERNALITIES IN WATER DESALTING,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
C. E. Willis, and G. C. Rausser.
Water Resources Bulletin, Vol 9, No 1, p 54-72, February, 1973. 1 fig, 13 tab, 13 ref.

Descriptors: Water resources, *Investment, *Decision making, *Project planning, *Desalination plants, Construction, Timing, Size, Project feasibility, Project benefits, Estimating, Economics, *Water costs, Water conveyance, Computer programs, Equations, Mathematical models, Operations research, *California, Risks.
Identifiers: Learning functions, *Externalities, Bayesian procedures, Investment sequencing, Learning benefits.

The failure to recognize the learning process in new technologies such as desalting may lead to incorrect water resource investment decisions for two reasons. First, to neglect cost reductions stemming from 'learning by doing' implies an overestimation of desalting costs. Second, since learning in a particular plant may result in external (learning) benefits to other plants, these may serve as the basis for a subsidy intended to internalize such benefits. An investment decision model is presented in which these aspects are explicitly acknowledged. The criterion function for the model is net benefits (i.e., internal plus external benefits less costs); hence the components of the decision framework include an external benefits (subsidy) model, internal benefits measured in terms of an opportunity cost (importation of fresh water) which values water quality differences, and desalting costs. The research reported herein includes an estimation of learning functions for desalting and the results of a formulation designed to measure external benefits on the basis of these functions. These results are then incorporated into the decision framework for water resource investments which recognizes uncertainty in determining optimal timing of desalting construction; considered also are capacity and discount and growth rates. The region investigated comprises the San Luis Obispo and Santa Barbara Counties in California. (Bell-Cornell)
W73-10018

3B. Water Yield Improvement

PROCEEDINGS--SOUTHERN PLAINS REGION CLOUDTAP CONFERENCE.

Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, 1972. 165 p.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Conferences, *Texas, Publications, Information retrieval, Great plains, Programs, Project purposes, Cloud physics, Precipitation (Atmospheric), Methodology, Aircraft, Silver iodide, Fertilizers, Radar, Data collections, Crop response, Correlation analysis, Economics, Costs, Governments.
Identifiers: *Symposium proceedings, Dallas (Tex).

The Texas Water Development Board, the Texas Water Conservation Association, and the Oklahoma State Department of Agriculture jointly arranged a symposium on weather modification projects and programs currently being carried out in Texas, Oklahoma, New Mexico, Kansas, and elsewhere. The Southern Plains Region Cloudtap Conference, which convened in Dallas, Texas, on October 16, 1972, had as its objective the bringing together of scientists involved in weather modification activities, and farmers, ranchers, businessmen, and public officials. Because of the wide interest in weather modification in the Southern Plains Region and the potential that cloud seeding may hold as a source of supplemental water supplies, the 11 papers presented at the symposium have been compiled and reproduced in this volume to make them available for distribution. The introduction made by the Honorable David Hall, Governor of Oklahoma, and comments made by participants of the symposium are also included. (See W73-09774 thru W73-09784) (Woodard-USGS)
W73-09773

RECLAMATION'S GREAT PLAINS WEATHER MODIFICATION PROGRAM--A STUTUS REPORT,
Bureau of Reclamation, Denver, Colo. Div. of Atmospheric Water Resources Management.
A. M. Kahan.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 5-24, 1972. 3 fig, 1 tab.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Precipitation (Atmospheric), *Great plains, Aircraft, Federal government, Projects, Methodology, Snow, Cloud physics, Silver iodide, Salts, Ammonium salts, Nitrates, Ureas, Costs, Reviews, Evaluation, Conferences.
Identifiers: *Bureau of Reclamation, Skywater projects, Hygroscopic materials.

Weather modification is rapidly acquiring a transitional status from strictly research to full application. Under the Bureau of Reclamation's leadership, a program called Project Skywater has grown from a budget of $100,000 covering 3 contracts to an annual budget of $6,600,000 covering 49 contracts. From the beginning, attention was focused on the Great Plains Region. A table lists the contracts involved in the Great Plains Region and the completion dates. About 90% of Project Skywater funds are spent in the field by the participating contractors, many of whom are in private sector. A bureau staff of 25, including people experienced in weather modification, meteorology, other sciences, engineering, and administration, is centrally located in Denver to plan and direct the program. Hygroscopic seeding is a relatively new type of seeding being developed which promises to be very effective in modifying clouds unaffected by silver iodide. In hygroscopic seeding, such materials as common salt and a mixture of ammonium nitrate/urea may be used. They have the unique ability to absorb water vapor from the surrounding air. It is the Bureau of Reclamation's contention that scientifically sound local, state, and federal cooperative programs can be implemented to provide both the necessary learning and the immediate benefits of additional water. (See also W73-09773) (Woodard-USGS)
W73-09774

THE SOUTHERN PLAINS SKYWATER PROJECT,
Weather Science, Inc., Norman, Okla.

In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas Texas: Texas Water Development Board, p 25-30, 1972. 1 fig.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Precipitation (Atmospheric), *Southwest U.S., Oklahoma, Texas, Projects, Methodology, Silver iodide, Ammonium salts, Nitrates, Ureas, Fertilizers, Cloud physics, Aircraft, Correlation analysis, Reviews, Evaluation.
Identifiers: Southern Plains, Skywater project, Hygroscopic materials.

The Southern Plains Skywater Project is sponsored by the Division of Atmospheric Water Resources Management, Bureau of Reclamation, Denver, Colorado. The project was formed during the spring of 1972 and is planned to continue for three consecutive years. The project will develop better methods for increasing usable precipitation from cloud seeding. In addition, the project is designed to provide increased water supplies for the people in the target area as a co-product of the experimental program. The operational area includes nine counties of southwestern Oklahoma and three counties of the Texas Panhandle. Experimental cloud seeding is to be conducted primarily during the spring, summer, and fall when convective or cumulus cloud systems deliver most of the precipitation which falls annually in this area. Since the Skywater Project is developing operationally useful techniques, the constraints are similar to those which are commonly experienced by operational cloud seeders. This includes the use of applicable aircraft, radar and other equipment and a 24-hour, seven-day-per-week alert. (See also W73-09773) (Woodard-USGS)
W73-09775

AREAS OF NEEDED EMPHASIS TO BRING WEATHER MODIFICATION TO AN ACCOUNTABLE OPERATIONAL STATE,
Meteorology Research, Inc., Altadena, Calif.
J. R. Stinson.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 31-38, 1972.

Descriptors: *Weather modification, *Cloud seeding, *Precipitation (Atmospheric), *Programs, Decision making, Governments, Regulation, Methodology, Planning, Reviews, Evaluation.
Identifiers: *Weather modification accountability.

This paper outlines some of the areas of needed emphasis to make weather modification operations more accountable to: (1) public at large, (2) program sponsor, (3) scientific and engineering fields on which these operations are based, and (4) the environment in general. The basic point of view is that greater accountability is required of the regulators, sponsors, and operators. Those programs with inadequate conceptual design, concern for public safety, decision systems, engineering execution, evaluation, and environmental concern should be expected to be denied. The respon-

sibility for the proper conduct of operational weather modification programs is distributed among the regulatory agency, program sponsor, weather modification operator, and the evaluator. One needed development emphasis is to determine appropriate requirements for the program data bank. Along with the program data bank, the concept of paying the costs of meaningful review and evaluation must be accepted. Reasonable required inputs into the project data bank include the decision criteria, all decision data, the seeding log, and all sounding, rainfall, photography, radar and other data bearing on the program. (See also W73-09773) (Woodard-USGS)
W73-09776

THE SAN ANGELO CUMULUS PROJECT,
Meteorology Research, Inc., Altadena, Calif.
T. B. Smith.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 51-57, 1972.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Texas, Methodology, Silver iodide, Fertilizers, Aircraft, Radar, Cloud physics, Meteorological data, Rain gages, Correlation analysis, Projects.
Identifiers: *San Angelo area (Tex), Hygroscopic materials.

In early 1971 the Bureau of Reclamation, through its Office of Atmospheric Water Resources Management, initiated a weather modification program in the area of San Angelo, Texas. The immediate impetus for the program came from a persistent drouth in the area and, in particular, from dwindling water supplies in the Twin Buttes Reservoir near San Angelo. The basin program objectives were twofold: (1) to test the existing technology for silver iodide treatment of cumulus clouds in the west Texas area, and (2) to develop and test a new technology for the hygroscopic treatment of such clouds. During the 1972 summer program the principal components consisted of two aircraft, an M-33 radar set, and a network of rain gages. One of the aircraft operated at cloudbase measuring cloud size, updraft strengths, and rainfall from the cloud. This aircraft released hygroscopic material into the base of those clouds which had been selected for randomized treatment by ground personnel at the radar. The remainder of the clouds were left untreated for comparison. Measurements provided specific differences between treated and untreated clouds and provided data for comparison with model calculations. (See also W73-09773) (Woodard-USGS)
W73-09778

RESULTS FROM AN APPLICATIONS PROGRAM OF HAIL SUPPRESSION IN TEXAS,
Atmospherics, Inc., Fresno, Calif.
T. J. Henderson, and S. A. Changnon.
In: Proceedings of Southern Plains Region Cloudtap Converence, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 59-66, 1972. 6 fig, 7 tab, 6 ref.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Hail, *Texas, Agriculture, Damages, Economics, Crop response, Insurance, Aircraft, Silver iodide, Cloud physics, Meteorological data, Correlation analysis.
Identifiers: *Hail suppression, *Texas Panhandle, Hail crop damage.

Hail damage to agricultural crops and property in the Texas Panhandle has long been recognized as a major influence on the total economy of the state. An applications weather modification program designed to suppress hail within portions of northern Texas was conducted during the May-October periods of 1970 and 1971. The operational design included three aircraft aerial applications of silver iodide at cloudbase in the inflow areas considered to be appropriate to those particular volumes of clouds which give birth to and allow growth of hailstones. The crop-hail insurance loss data indicate that the loss-cost values in the target county area of 1970 and 1971 were below average, and that most control counties had below normal annual loss-cost in these two years. Pertinent data are illustrated. (See also W73-09773) (Woodard-USGS)
W73-09779

SEEDING CLOUDS FROM THE GROUND IN OKLAHOMA,
Water Resources Development Corp., Palm Springs, Calif.
I. P. Krick.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 67-87, 1972. 10 fig, 1 plate, 1 tab, 17 ref.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Oklahoma, Crop response, Cloud physics, Silver iodide, Rainfall, Meteorological data, Correlation analysis, Hydrologic data, Maps, Contours.
Identifiers: Silver iodide dispensing ground generator.

Oklahoma's Governor Hall established an executive committee for the study of weather modification in all of its aspects in July 1971. The work of this broad-based group, under the chairmanship of Mr. Ferdie Deering, editor and manager of the Farmer-Stockman, has been effective in producing far-reaching benefits to Oklahoma and awakening widespread interest in the subject throughout the nation. The programs described were first initiated in Oklahoma during April of 1972. A short and long range weather forecasting laboratory is maintained for the development of operational design and for calculating control data, so that dispersion patterns can be accurately computed continuously from ongoing surface and upper air information. This technique permits one to key the operational impact, either from single cloud formations or cloud bands associated with storm fronts, to specified target areas. Under generally similar airflow conditions and meteorological characteristics, it is possible to calculate the required ground-based generator sites to use in seeding a given target with silver iodide for optimum amounts of precipitation. With an output of one-half gram per hour, the optimum effects are achieved around 30 to 50 miles downwind from the generator in typical Oklahoma summer rainfall situations. Pertinent data are illustrated. (See also W73-09773) (Woodard-USGS)
W73-09780

A RANDOMIZED CLOUD SEEDING PROJECT IN NORTHERN NEW MEXICO,
New Mexico State Univ., University Park. Jemez Atmospheric Water Resources Research Project.
C. G. Keyes, Jr.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 89-100, 1972. 3 fig, 10 ref. AWRM 14-06-D-6903 and 14-06-D-6144.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *New Mexico, Silver iodide, Rainfall, Clouds, Water yield improvement, Meteorological data, Projects, Planning, Methodology, Precipitation (Atmospheric), Snowfall.
Identifiers: *Santa Fe area (N Mex), *Cuba area (N Mex), Silver iodide dispensing ground generator.

The Jemez Atmospheric Water Resources Research Project of New Mexico State University is developing a precipitation management system in northern New Mexico. Since the fall of 1968, randomized ground-based AgI seeding operations have been conducted during each winter season, November through March, from in or near the town of Cuba, New Mexico. The primary target area is in the Sierra Nacimiento Mountains just east of Cuba, and the secondary target area is located in the Sangre de Cristo Mountains just east of Santa Fe, New Mexico. The Mesoscale observation network and other supporting facilities operated during each winter season included: ground-based AgI generators; a network of 25 or more continuous recording Belfort precipitation gages in the immediate target area and 4 or more gages in the downwind area; upper-air measurements during seedable units; weather radar and ice nuclei counter equipment; and other support facilities, including radio communications, over-snow vehicles, a vehicle maintenance section, and a time-share computer system for real-time and post evaluation of the project. A few significant increases (and/or decreases) of precipitation have occurred during some of the seeding periods of the past four years. Pertinent data are illustrated. (See also W73-09773) (Woodard-USGS)
W73-09781

FEASIBILITY STUDIES OF PRECIPITATION ENHANCEMENT IN ILLINOIS,
Illinois State Water Survey, Urbana. Atmospheric Science Section.
S. A. Changnon, Jr.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 101-109, 1972. 3 fig.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Illinois, Feasibility studies, Project purposes, Crop response, Methodology, Aircraft, Silver iodide, Clouds, Agriculture, Economics, Costs, Computer models, Meteorological data, Correlation analysis.

Illinois is considered by many to have adequate rainfall. However, studies show that in 9 out of 10 years crop yields would benefit from increased July-August rainfall. Weather modification benefits to agriculture and water supplies have potential in all parts of Illinois. However, the greatest economic benefits from weather modification would probably be realized in southern Illinois because of its thinner soils and greater dependence on surface water supplies. To know whether an economically beneficial rain enhancement program is feasible in Illinois, it must be determined if the clouds will respond to an artificial stimulus and how often suitable clouds may be expected. Answers about the clouds will be obtained by flying an instrumented airplane beneath and through clouds also observed by radar during the various seasons of the year. A computer will be used to simulate the clouds and cloud changes on the mesoscale. It will utilize measures obtained from radiosondes of temperature, relative humidity, and pressure. It would be premature to say that a cloud seeding program could be carried out within the state. This question will be resolved by the various scientific studies described. (See also W73-09773) (Woodard-USGS)
W73-09782

PROGRESS IN THE SOUTH DAKOTA WEATHER MODIFICATION PROGRAM,
South Dakota Weather Control Commission, Pierre.
M. C. Williams.
In: Proceedings of Southern Plains Region Cloudtap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 111-126, 1972. 5 fig.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *South Dakota, Project purposes, State governments, Contracts, Data

collections, Precipitation (Atmospheric), Clouds, Aircraft, Radar, Silver iodide, Rain gages, Crop response, Conferences.
Identifiers: *Hail suppression.

Design, organization and initiation of a statewide program of weather modification was undertaken by the South Dakota Weather Control Commission in September 1971. The program was designed to provide for increased rainfall and decreased hail by cloud seeding. These efforts led to the development of a limited scale field program during the summer of 1972. State funding for the summer field activities was provided by the 1972 legislature in a $250,000 appropriation. Contracts with private operators for equipment and personnel were awarded in March in preparation for field activities during the period May 1 through August 31. Aircraft acquired under these contracts were of the turbocharged, light, twin-engine type, fully equipped for high altitude and instrument operations. Each aircraft was equipped with both acetone-silver iodide type generators with a capability of dispensing silver iodide at a rate of 150 to 300 grams per hour and pyrotechnic devices capable of dispensing 200 grams per minute. Thus, a wide range of capabilities was provided for two types of seeding materials to permit either rainfall increase or hail suppression activities. Seeding results for 1972 operations were not available in time for this report. (See also W73-09773) (Woodard-USGS)
W73-09783

GROMET II, RAINFALL AUGMENTATION IN THE PHILIPPINE ISLANDS,
Naval Weapons Center, China Lake, Calif.
P. St-Amand, D. W. Reed, T. L. Wright, and S. D. Elliott.
In: Proceedings of Southern Plains Region Cloud-tap Conference, October 16, 1972, Dallas, Texas: Texas Water Development Board, p 127-160, 1972. 54 fig, 11 tab.

Descriptors: *Weather modification, *Cloud seeding, *Artificial precipitation, *Islands, Pacific Ocean, Crop response, Methodology, Aircraft, Silver iodide, Rainfall, Agriculture, Economics, Data collections, Costs, Evaluation, Governments.
Identifiers: *Philippine Islands.

A severe drought in the Philippine Islands during 1968 and 1969 led the Philippine Government to try cloud seeding as a means of rainfall augmentation. With the help of the United States, a silver iodide seeding project, GROMET II, was conducted over the entire archipelago from the end of April through mid-June 1969. Pyrotechnically generated silver iodide was released in updrafts in growing clouds, and through judicial placement and timing of seeding events individual clouds were organized into larger cloud systems. Rainfall estimated as at least 3 x 10 to the tenth power cubic meters of water fell from seeded clouds. Benefits derived from the project included marked improvement in the agriculture, increased sugar production amounting to 43 million U.S. dollars, and augmented crops of rice and corn sufficient to make anticipated importation unnecessary. In addition, local personnel were trained in seeding techniques. Because of the success of GROMET II the Government of the Philippines conducted a similar operation during 1970 and planned another for 1971. (See also W73-09773) (Woodard-USGS)
W73-09784

FIFTH ANNUAL SURVEY REPORT ON THE AIR WEATHER SERVICE, WEATHER MODIFICATION PROGRAM (FY 1972),
Air Weather Service, Scott AFB, Ill.
H. S.Appleman, T. S. Cress, R. I. Sax, and K. M. Weickmann.
Technical Report 249, December 1972. 16 p, 10 fig, 7 tab, 3 ref.

Descriptors: *Weather modification, *Cloud seeding, *Fog, *Ice, Methodology, Aircraft, Clouds, Projects, Costs, Propane.
Identifiers: *Ice-fog dispersal, Downdraft.

This annual report of the weather modification activities of the Air Weather Service covers the projects, their operation and results, undertaken during FY 1972. Its primary purpose is to inform AWS field personnel of the progress in weather modification made during the year. Details of the projects are only briefly discussed as such details are published elsewhere. COLD FLAKE, COLD WAND, COLD CLEAR, COOL VIEW, and the Elmendorf ground-based propane system are the activities covered. COLD WAND and COLD FLAKE were ground-based techniques at Fairchild AFB and Hahn AB, respectively, and COLD CLEAR was airborne technique in Alaska and Europe. In addition, a ground system was installed at Elmendorf AFB, Alaska, to replace airborne seeding there. Project COOL VIEW was an AWS field test of ice-fog dissipation techniques at Eielson AFB, Alaska. A brief description of procedures, equipment, and results of the test is given. (Woodard-USGS)
W73-09785

THE MOKOBULAAN RESEARCH CATCHMENTS,
U. W. Nanni.
S Afr For J. 78, p 5-13, 1971. Illus.
Identifiers: *Catchments, Flow, Forests, Hydrology, *Mokobulaan, Hydrologic project, *Rainfall, Stream.

The Mokobulaan Hydrologic Project, consisting of 3 small catchments, is described. Two catchments will be afforested with 2 different exotic tree species within the next few years while the third catchment will remain under its present management, conservative grazing by sheep. Monthly rainfall and streamflow data for 12 years are tabulated.--Copyright 1972, Biological Abstracts, Inc.
W73-09910

WEATHER MODIFICATION: AN ECONOMIC ALTERNATIVE FOR AUGMENTING WATER SUPPLIES,
South Dakota State Dakota State Univ., Brookings. Dept. of Economics.
R. K. Rudel, H. J. Stockwell, and R. G. Walsh.
Water Resources Bulletin, Vol 9, No 1, p 116-128, February 1973. 2 fig, 5 tab, 18 ref.

Descriptors: *Colorado River Basin, *Weather modification, *Cost-benefit analysis, Economic impact, Economic feasibility, Water supply, Water resources development, Cloud seeding, *Alternative planning, *Colorado.
Identifiers: Extra-market, *Water supply augmentation, San Juan Mountains (Colorado).

Evaluation of weather modification as a competitive or supplemental means of augmenting water supplies depends on quantitative estimates of benefits and costs, and the full consideration of extra-market values. Experimental results of cloud seeding in Southwestern Colorado suggest that runoff can be increased by 25 percent over a 3,300 mile area. The economic consequences in the Colorado River Basin are estimated using benefit-cost analysis. Results suggest that weather modification is an economically feasible means to provide additional water for the basin, and it appears to be one of the least cost alternatives compared with other proposed means of augmenting water supplies. A very low proportion of weather modification costs are fixed; thus the program is easily reversible. Also, a relatively small increase in daily precipitation covers the direct costs of operation. Benefits of water produced by weather modification include power production and irrigation of forage crops. In the long run, if water is used for higher valued fruit and vegetable production, or for domestic and industrial purposes, its value would rise sharply. Preliminary investigation of extra-market costs and benefits suggests that while they have little effect on the benefit-cost ratio, they may be very important to individuals and groups affected. (Bell-Cornell)
W73-10021

ICE NUCLEATION: ELEMENTAL IDENTIFICATION OF PARTICLES IN SNOW CRYSTALS,
National Oceanic and Atmospheric Administration, Boulder, Colo. Atmospheric Physics and Chemistry Lab.
F. P. Parungo, and R. F. Pueschel.
Science, Vol 180, No 4090, p 1057-1058, June 8, 1973. 2 fig, 4 ref.

Descriptors: *Ice, *Cloud seeding, *Electron microscopy, *X-ray analysis, *Nucleation, Silver iodide, Crystal growth, Chemistry of precipitation, Instrumentation.

Information about the elemental composition of atmospheric nuclei is necessary for a quantitative evaluation of deliberate and inadvertent weather modification. In seeding experiments on supercooled clouds, AgI is most often used as the seeding agent. Because the presence of silver in seeded snow can be due to nucleation, scavenging, or sedimentation, analyzing the silver concentration in the snow provides information about the spatial and temporal distribution of AgI in a particular seeding area. Only by examining individual AgI particles in relation to individual snow crystals and identifying AgI as the nucleus is it possible to make an objective analysis of seeding experiments. A scanning field-emission electron microscope combined with an x-ray analyzer may be used to locate the ice nucleus within a three-dimensional image of a snow crystal and determine the chemical composition of the nucleus. This method can also be used for elemental analysis of natural ice nuclei and condensation nuclei. (Knapp-USGS)
W73-10037

ROCK MULCH IS REDISCOVERED,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
W. H. Fuller.
Progressive Agriculture in Arizona, Vol 25, No 1, p 8-9, January-February 1973, 5 fig.

Descriptors: *Mulching, *Rocks, *Rock fill, *Soil stabilization, Slope stability, *Erosion control, Surfaces, Rainfall-runoff relationships, Arid lands, Landscaping.

An example is presented of modern application of the ancient practice of rock mulching to conserve soil moisture for plant growth and soil erosion control. Illustrations show how 10 years experimentation have stabilized the steep slope originally characterized by lack of vegetation and erodible soil. Advantages cited are: soil erosion control, water conservation, aesthetic value, inexpensive land surface, requires little care, weed control relatively easy, establishment of native plants easy, and economy of maintenance. Since a high proportion of world deserts become paved with stones and rocks naturally, and are subject to high intensity rainfall, this practice provides effective protection. (Paylore-Arizona)
W73-10212

3C. Use of Water of Impaired Quality

PRESENT AND FUTURE WATER AND SALT BALANCES OF SOUTHERN SEAS IN THE USSR (SOVREMENNYY I PERSPEKTIVNYY

VODNYY I SOLEVOY BALANS YUZHNYKH MOREY SSSR).
State Oceanographic Inst., Moscow (USSR).
For primary bibliographic entry see Field 02H.
W73-09807

DEVELOPMENT PROPOSAL FOR LAGOONS,
Rhode Island Univ., Kingston. Dept. of Economics.
H. C. Lampe.
Maritimes, p 13-14, May 1972. 1 fig.

Descriptors: *Lagoons, *Brackish water, *Management, Research and development, *Social impact.
Identifiers: *Food sources, *Community-environment interaction.

Management schemes for brackish water lagoons are discussed. Proper development of lagoons may provide additional sources of high protein foods for increasing human populations. Lagoon environments and ecosystems are not fully understood at this point. Any plans to develop them effectively will entail more basic research. Part of this research must focus on the needs, aspirations, abilities and activities of the people affected by lagoon development. An Institute of Lagoon Studies has been proposed to coordinate research efforts by such varied groups as economists, sociologists, biologists and engineers. (Ensign-PAI)
W73-09886

PROBLEMS OF GROUNDWATER EXPLORATION IN METAMORPHIC ROCKS FOR DOMESTIC WATER SUPPLIES IN NORTHEASTERN BRAZIL,
Bundesforschungsanstalt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 02F.
W73-09952

STUDIES ON THE RECLAMATION OF ACID SWAMP SOILS,
Ministry of Agriculture and Lands, Kuala Lumpur (Malaysia). Div. of Agriculture.
For primary bibliographic entry see Field 02G.
W73-10017

CULTIVATION OF BARLEY FOR EVALUATING DESALINATION RATE OBTAINED BY LEACHINGS BY CASPIAN WATER, (IN RUSSIAN),
I. S. Rabochev, and V. N. Kravchuk.
Probl Osvoeniya Pustyn'. 2, p 51-53. 1972. English summary.
Identifiers: *Barley, Caspian waters, Cultivation, Evaluation, Leaching, *Saline soils.

Field tests were undertaken to prove Caspian water effective for desalinization of solonchaks. Barley may be cultivated with salt concentrations of 27 g/l in the top meter of soil and a chloride concentration of 13.5 g/l. Barley appears to be of biological value in desalting.--Copyright 1973, Biological Abstracts, Inc.
W73-10075

A POSSIBLE NEW METHOD FOR IMPROVING PLANT GROWTH IN SALINE AND CALCAREOUS ENVIRONMENTS,
University Coll. of North Wales, Bangor. Dept. of Biochemistry and Soil Science.
R. G. Wyn Jones.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec. 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 109-122. 4 fig, 6 tab, 30 ref.

Descriptors: *Saline soils, *Salt tolerance, *Corn (Field), *Ornamentals, Shrubs, Soil properties, Alkalinity, Plant growth regulators, Root systems, Plant growth, Radioecology, Sodium compounds.
Identifiers: Rubidium, Sodium radioisotopes.

Root application of choline chloride to crop plants and ornamental shrubs may prove useful in certain saline and calcareous environments. Possible causes of growth stimulation are: (1) increased root system, (2) root acid-production increasing nutrient availability as outlined, and (3) alteration in organic acid metabolism. Although growth was less than for low-salt controls, the shoot-growth inhibition during the first 24 hours was decreased with maize plants. It appeared that choline promoted tolerance only to the sodium ion and that the maximum effect was short-lived. In a small field trial on commercial rhododendron shrubs growing in a pH-7.5 alluvial soil, leaf chlorophyll contents increased three-to-four fold although the response of different varieties varied widely. (See also W72-10679) (Bopp-ORNL)
W73-10186

FIELD TRIALS ON IMPROVEMENT OF SALINE SOIL IN THE SIBARI PLAIN, (IN ITALIAN),
Bari Univ. (Italy).
V. V. Bianco, A. Patruno, and L. Cavazza.
Riv Agron. Vol 6, No 1, p 3-12, 1972. Illus. English summary.
Identifiers: Crops, Cultivation, Fertilizers, Field trials, *Italy (Sibari plain), Plain, *Saline soils, Soils.

Field trials on reclamation of a saline soil rich in Mg was attempted by deep ploughing, different crops, cultural practice and manure, S, and gypsum application. A negative relationship between salinity and pH was found; both were influenced by the amount of rainfall during the month before drawing samples. Soil reaction was weakly influenced by deep ploughing and rotation, but not in the same way every year. None of the techniques or materials used influenced the soil salinity. Probably the best way to improve this type of soil will be to lower and stabilize the water table that now is 150-200 cm deep. Among the plants used, sugar beet and alfalfa failed to grow and only sorghum and horse-bean gave good results. A weak positive correlation between barley yield and soil salinity was found. On wheat yields a negative action was shown by burying the barley straw and by gypsum application; good results were obtained by deep ploughing (50 cm) or green manure of horse-bean combined with shallow ploughing (25 cm). Yield of corn silage was enhanced by deep ploughing. Horse-bean yield was better with deep ploughing, manure and possible gypsum application.--Copyright 1972, Biological Abstracts, Inc.
W73-10382

3D. Conservation in Domestic and Municipal Use

ESTIMATING THE YIELD OF THE UPPER CARBONATE AQUIFER IN THE METROPOLITAN WINNIPEG AREA BY MEANS OF A DIGITAL MODEL,
For primary bibliographic entry see Field 02F.
W73-09950

3E. Conservation in Industry

WATER AND WASTEWATER MANAGEMENT IN DAIRY PROCESSING,
North Carolina State Univ., Raleigh. Dept. of Food Science.
For primary bibliographic entry see Field 05B.
W73-09755

THERMAL EFFECTS OF PROJECTED POWER GROWTH: SOUTH ATLANTIC AND EAST GULF COAST RIVER BASINS,
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05C.
W73-09848

SYSTEMS APPROACH TO POWER PLANNING,
Bechtel Corp., San Francisco, Calif. Hydro and Community Facilities Div.
For primary bibliographic entry see Field 06A.
W73-09859

A U.S. ENERGY POLICY NOW.
For primary bibliographic entry see Field 06D.
W73-09862

LOW GRADE HEAT FROM THERMAL ELECTRICITY PRODUCTION, QUANTITY, WORTH AND POSSIBLE UTILIZATION IN SWEDEN,
Swedish Board for Technical Development, Studvik (Sweden).
For primary bibliographic entry see Field 05G.
W73-09865

A FUNDAMENTAL STUDY OF THE SORPTION FROM TRICHLOROETHYLENE OF THREE DISPERSE DYES ON POLYESTER,
Auburn Univ., Ala. Dept. of Textile Engineering.
S. Perkins, and D. M. Hall.
Textile Research Journal, Vol 43, No 2, p 115-120, February 1973. 9 fig, 4 tab, 12 ref. OWRR A-020-ALA (1).

Descriptors: *Dyes, Analytical techniques, Enthalpy, Polarity, Solvents, *Textiles, *Sorption, Dye dispersion, Equilibrium, Films, Plastics, Polymers, Industrial production, Chemical industry.
Identifiers: *Polyester film, *Trichloroethylene, Dyeing rates, Diffusion coefficient, *Solvent processing.

Dyeing of polyester film from trichloroethylene with three highly purified disperse dyes is reported. Rate of sorption of each dye by polyester increases greatly with increasing temperature. Equilibrium sorption measurements indicate that two of the dyes, C.I. Disperse Red 15 and C.I. Disperse Orange 3, give constant partition coefficients. C.I. Disperse Orange 3 gives Freundlich type isotherms, possibly due to aggregation of dye in solution which increases with increasing concentration of dye in solution and with decreasing temperature. The tendency of dye to transfer from solution to fiber as expressed by the free energy of sorption increases with increasing polarity of the dye molecules. The enthalpy of dyeing is used to quantitatively express the effect of temperature on equilibrium sorption of dye by the substrate.
W73-10151

GEOTHERMAL WATER AND POWER RESOURCE EXPLORATION AND DEVELOPMENT FOR IDAHO,
Boise State Coll., Idaho. Dept. of Geology.
For primary bibliographic entry see Field 06B.
W73-10217

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS, PART 2.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-10312

FISH PROTEIN CONCENTRATE: A REVIEW OF PERTINENT LITERATURE WITH AN EMPHASIS ON PRODUCTION FROM FRESH-WATER FISH,
State Univ., Coll., Buffalo, N.Y. Great Lakes Lab.
E. B. Robson.
Special Reports No. 3 and No. 5, January and March, 1970. 188 p, 10 fig, 17 tab, 206 ref.

Descriptors: Freshwater fish, *Proteins, Technology, *Reviews, Bibliographies, *Fisheries.
Identifiers: *Fish protein concentrate, Fish flour, Manufacturing.

The state of the art of fish protein concentrate (FPC) technology is discussed. Such information is essential background for establishing an FPC factory. Topics discussed in the survey include (1) chemical and biological aspects of FPC, (2) practical and theoretical problems of FPC manufacture, (3) methods of FPC manufacture, (4) the possibility of producing FPC from non-hake-like fish, and (5) by-products of FPC manufacture. In addition, studies on the use of FPC in human nutrition are reviewed and a list of selected references is provided. Recent developments involved with the manufacture of FPC are summarized in a supplement. These include issues in regulation of the manufacture of FPC, socio-economic factors behind the use of FPC, and discussion of new technologies not previously mentioned. (Weaver-Wisconsin)
W73-10313

3F. Conservation in Agriculture

INVESTMENT PLANNING FOR IRRIGATION DEVELOPMENT PROJECTS,
Boston Univ., Mass.
T. S. Glickman, and S. V. Allison.
Socio-Economic Planning Sciences, Vol 7, No 2, p 113-122, April 1973. 19 tab, 3 ref, 1 appen.

Descriptors: *Irrigation, *Project planning, *Investment, *Planning, *Optimization, Agriculture, *Benefits, Capital costs, Cost-benefit analysis, Project planning, Dynamic programming, Mathematical models, Operations research, Groundwater, Replacement costs, Operation and maintenance, Drilling, Wells, Decision making, Dug wells, Water distribution (Applied), Pipes, Electric power.
Identifiers: *Tubewells, Developing countries, Bangladesh, Investment schedules, Diesal power.

This paper considers the most economical selection of available technologies which should be employed and the schedule which should be followed in implementing them for irrigation by tubewells to obtain an investment plan which maximizes the net agricultural benefits from a proposed project in a developing country. Cost and benefit relationships are derived and incorporated into a mathematical model which is solved using a modification of the dynamic programming procedure for solving the knapsack problem. The optimization model is intended to assist in planning groundwater development for irrigation by means of drilled wells (Tubewells), as opposed to dug wells. To generate optimal investment schedules within the range of available technologies, the model employs data from engineering/economic relationships representing conditions encountered in Bangladesh. Each technology is characterized by a particular combination of drilling method, component material, and discharge capacity. Costs attributed to the project are capital costs of well construction and costs of operation, maintenance and replacement during the projected 20-year economic lefe of the project. Project benefits are the increased agricultural revenues during this time horizon resulting from improvement in crop yields. The optimal schedule is seen to favor small capacity wells, drilled by indigenous methods, with supplementary water distribution systems. (Bell-Cornell)
W73-09831

EVAPOTRANSPIRATION OF DIFFERENT CROPS IN A MEDITERRANEAN SEMI-ARID REGION, (IN FRENCH),
Office de la Recherche Scientifique et Technique Outre-Mer, Abidjan (Ivory Coast). Centre d'Adiopodoume.
For primary bibliographic entry see Field 02D.
W73-09836

THE INFLUENCE OF NITROGEN LEACHING DURING WINTER ON THE NITROGEN SUPPLY FOR CEREALS, (IN GERMAN),
Kiel Univ. (West Germany). Institut fuer Pflanzenbau und Pflanzenzuechtung.
J. Koehnlein.
Landwirtsch Forsch. Vol 25, No 1, p 1-15. 1972. English summary.
Identifiers: *Cereals, *Leaching, *Nitrogen, Potato-D, Summer, Wheat-M, Winter, Soils.

The leaching of N dressings in autumn was studied for 4 yr in crop rotations on loamy Parabrownearth. The experimental crop was summer wheat after potatoes dressed with organic manure. The accessibility of rainfall during winter was controlled by using PE-Folies placed on the plots (30 m2) at different periods. The following plots were compared high N supply in autumn and normal winter rainfall; high N supply in autumn and reduced winter rainfall; high N supply in autumn without any rainfall during winter; high N supply in spring; reduced N supply in spring; without N supply and with normal rainfall; in 2 yr: no N supply and no rainfall. When the accessibility of rainfall during winter was stopped, the effect of a N-fertilizer dressing in autumn showed no difference from that given in spring. When the accessibility of the rainfall during winter was reduced, the effect of N-fertilizer dressed in autumn appeared later than that given in spring and also later than the N-fertilizer dressed in autumn without rainfall. The effect in the yield lies between the N-fertilizer given in spring and the N-fertilizer given in autumn with the whole rainfall during winter. The effect of N-fertilizer in autumn with normal rainfall fluctuates between 'no effect' and the effect obtained with reduced amount of rainfall during winter.--Copyright 1972, Biological Abstracts, Inc.
W73-09874

COMPLEX OF SOIL-DWELLERS IN SUGAR--BEET FIELDS ON FLOODLANDS, (IN RUSSIAN),
Rostov-on-Don State Univ. (USSR).
V. A. Minoranskii.
Zool Zh. Vol 51, No 2, p 300-303. 1972. English summary.
Identifiers: *Beet-D, *Floodlands, Pests (Soil), Phytophages, Predators, Saprophages, Soils, Sugar beets.

The complex of soil-dwellers of sugar beet fields located on floodlands is characterized by a higher density and variety as compared with that in terrace fields. In floodland fields the numbers of most of predators and saprophages are higher. Of phytophages, hygro- and mesophilous species predominate. Some of them may become dangerous pests. At the same time, some insects in floodland fields are of no agricultural importance in river valleys.--Copyright 1972, Biological Abstracts, Inc.
W73-09888

THE EFFECT OF TOTAL WATER SUPPLY AND OF FREQUENCY OF APPLICATION UPON LUCERNE: I. DRY MATTER PRODUCTION,
Reading Univ. (England). Dept. of Agricultural Botany.
R. W. Snaydon.
Aust J Agric Res. Vol 23, No 2, p 239-251. 1972. Illus.
Identifiers: *Dry matter, *Evaporation (Pan), Irrigation, *Lucerne-D, Medicago-Sativa-D, Water supply (Plants).

The total quantity of water supplied to an established lucerne (Medicago sativa) stand, and the frequency of water application, were varied independently. The total quantity of water supplied during summer, autumn, and early winter was expressed as a proportion of class A pan evaporation (E sub pan), ranged from 0.4 to 3.5 E sub pan. Dry matter production, at total water supply equal to E sub pan, varied between 8.6 kg per ha per day in early winter (May-June) and 97 kg per ha per day in summer (Jan.-Feb.), and was correlated (r ± 0.99) with mean minimum temperature. The form of the response curve of log sub e dry matter production to water supply, relative to E sub pan, was similar during all seasons. Dry matter production increased approximately logarithmically with increasing water supply up to the equivalent of 0.5 E sub pan, reached a maximum at about 1.5 E sub pan, and declined above this. A response surface was constructed, based upon total water supply and mean minimum temperature. Frequency of application, at a given total water supply, had no significant effect on dry matter production when total supply exceeded 0.5 E sub pan in any season. At a total water supply equal to 0.2 E sub pan, frequent small applications of water (5mm) produced 50% more dry matter than less frequent large applications (20 and 80 mm) during summer, but only 30% as much as the less frequent applications in the subsequent autumn. Water use efficiency (ratio of dry matter production to total water supplied) was greatest at 0.5 E sub pan at all frequencies of application in summer. During the 6 mo. after irrigation treatments ceased, dry matter production was generally related to the amount of available water in the soil, but production was less, even 18 mo. later, on plots that had previously received the heaviest irrigation (130 mm per month). Frequency of application had no significant effect upon subsequent yield, but frequent small applications in 1 summer reduced the capacity of lucerne to extract soil water at low water potentials in the following summer. (See also W73-09976)--Copyright 1972, Biological Abstracts, Inc.
W73-09975

THE EFFECT OF TOTAL WATER SUPPLY, AND OF FREQUENCY OF APPLICATION, UPON LUCERNE: II. CHEMICAL COMPOSITION,
Reading Univ. (England). Dept. of Agricultural Botany.
R. W. Snaydon.
Aust J Agric Res. Vol 23, No 2, p 253-256. 1972. Illus.
Identifiers: Chemical composition, Digestibility, Evaporation (Pan), *Lucerne-D, Medicago-Sativa-D, *Nitrogen, *Phosphorus, Water supply (Plants).

Total water supply, expressed as a proportion of class A pan evaporation (E sub pan), and frequency of water application were varied independently during summer. The P concentration in the shoots of lucerne (Medicago sativa) increased by 35% when the total water supply was increased from 0.1 to 1.0 E sub pan; the N concentration was not significantly affected. The in vitro digestibility of leaf and stem fractions decreased with increasing total water supply, and the proportion of highly digestible fractions (leaf and flower) also decreased, so that total shoot digestibility decreased from 65% at 0.24 E sub pan to 55% at 0.58 E sub pan. Frequency of water application had no significant effect upon P or N concentra-

tion or in vitro digestibility. (See also W73-09975)--Copyright 1972, Biological Abstracts, Inc.
W73-09976

INFLUENCE OF THE NUTRIENT SOLUTION CONCENTRATION UPON THE WATER ABSORPTION OF PEA PLANTS, (IN BULGARIAN),
Institut po Furazhite, Pleven (Bulgaria).
Iv Kalaidjiev, V. Petkov, and V. Radeva.
Rastenievd Nauki. Vol 9, No 3, p 3-10. Illus. 1972. English summary.
Identifiers: Absorption (Plants), *Plant nutrients, *Pea plants.

Pea plants absorb water at a different intensity during their development. The first water absorption maximum occurs at the mass bloom stage and the second and greatest one occurs at the filling and ripening of seeds. Plants raised in a nutrient solution of a higher concentration have a larger content of bound and a lesser content of free water than plants raised in a normal nutrient solution. The water potential of the cells increases with the advancement of their development. It is greater in plants raised in a nutrient solution of a higher concentration.--Copyright 1973, Biological Abstracts, Inc.
W73-09978

THE EFFECT OF DIFFERENT LEVELS OF WATER SUPPLY ON TRANSPIRATION COEFFICIENT AND PHOTOSYNTHETIC PIGMENTS OF COTTON PLANT,
National Research Centre, Cairo (Egypt). Plant Physiology Dept.
M. T. El-Saidi, and A. A. El-Mosallami.
Z Acker Pflanzenbau. Vol 135, No 2, p 135-142. 1972.
Identifiers: Carotenoids, Chlorophyll, *Cotton plants, *Photosynthesis, Pigments, *Transpiration coefficient, Water supply (Plants).

Different levels of soil moisture had large effect on the cotton yield, transpiration coefficient and productivity of transpiration and the photosynthetic pigments. This effect is related mainly to which phase of cotton development was exposed to drought or excess of water supply. Excess of water supply in different period of plant growth increased the amount of chlorophyll a, especially in the treatment with excess of water from seedlings to budding, in which chlorophyll a remained at a higher level than the control. Excess of water in the flowering stage decreased the amount of carotenoids. Water stress increased the total chlorophyll contents a + b in green leaves but not in yellow and brown ones. Productivity of transpiration decreased at water stress and excess of water supply, but the transpiration coefficient was high. This means that a larger amount of water was lost than in control.--Copyright 1973, Biological Abstracts, Inc.
W73-09979

NEW METHODS OF SOIL RECLAMATION IN ARID LANDS, (IN RUSSIAN),
I. S. Zonn.
Probl Osvoeniya Pustyn'. 1, p 46-55. 1972. Illus. English summary.
Identifiers: *Arid lands, Irrigation, *Literature surveys, Reviews, *Soil reclamation.

A survey of the world literature is given on soil reclamation in arid lands, new irrigation techniques and constructing controlled environment systems to grow agricultural plants.--Copyright 1973, Biological Abstracts, Inc.
W73-09981

PRELIMINARY RESULTS ON THE EFFECT OF POLYETHYLENE FOIL APPLIED AS A BARRIER LAYER, (IN GERMAN),
Rostock Univ. (East Germany). Institut fuer Meliorationswesen.
For primary bibliographic entry see Field 02D.
W73-09983

THE EFFECTIVITY OF NITROGEN FERTILIZATION UNDER DIFFERENT CONDITIONS OF PRODUCTION, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Leipzig (East Germany). Institut fuer Mineraldueng.
R. Jauert, H. Goerlitz, O. Hagemann, R. Breternitz, and H. Ansorge.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 4/5, p 349-360. 1972. Illus. English summary.
Identifiers: Fertilization, Grass, Irrigation, Maize, *Nitrogen fertilizer, Oats, Potatoes, Rye, *Sprinkler irrigation, Sugarbeets.

On Tieflehm-Fahlerde (Sl 4D 33/30), longterm combination experiments with varied N fertilization and additional clean-water sprinkler irrigation of sugarbeet (O to 400 kg N/ha), oats (O to 200 kg N/ha), field grass (O to 700 kg N/ha), potatoes (O to 300 kg N/ha), winter rye (O to 250 kg N/ha) and ensilage maize (O to 300 kg N/ha) showed very good effects of combinations of fertilization and sprinkler irrigation at a high productivity per kg N. The economic effect was highest with sugarbeet and potatoes. With sugarbeet, oats, field grass, potatoes, winter wheat and ensilage maize that were grown on black earth (L 2 Lo 94/96) and dressed with the same amounts of fertilizer, the effectiveness of N fertilization was only slightly improved by additional sprinkler irrigation.--Copyright 1973, Biological Abstracts, Inc.
W73-09986

SAMPLING, HANDLING AND COMPUTER PROCESSING OF MICROMETEOROLOGICAL DATA FOR THE STUDY OF CROP ECOSYSTEMS,
For primary bibliographic entry see Field 07C.
W73-10001

THE DAILY COURSE OF STOMATA APERTURES IN OATS (AVENA SATIVA L.) OF DIFFERENT AGE OF THE PLANTS RESPECTIVELY LEAVES,
Leipzig Univ. (East Germany).
I. Frommhold.
Biochem Physiol Pflanz (BPP). Vol 163, No 2, p 216-224, 1972. Illus.
Identifiers: Age, Avena-Sativa, Carbon dioxide, Daily, Growth, *Leaves, *Oats, Oxide, Plants, *Stomata apertures.

During the growing of oat, the daily course of stomatal opening was measured at different stages of plant growth, and the opening capacity of the stomata in CO2-diminished air was checked. No direct correlation was found between the age of the plant leaf and the degrees of aperture of the stomata. Oats generally showed small apertures during day-time, but after application of CO2-diminished air the stomata opened wide. Relatively large openings seem to occur only during intensive growing of the leaves or plants.--Copyright 1973, Biological Abstracts, Inc.
W73-10066

WATER UPTAKE FROM FOLIAR-APPLIED DROPS AND ITS FURTHER DISTRIBUTION IN THE OAT LEAF,
Instituut voor Toepassing van Atoomenergie in de Landbouw, Wageningen (Netherlands).
D. H. Ketel, W. G. Dirkse, and A. Ringoet.
Acta Bot Neerl. Vol 21, No 2 p 155-166. 1972. Illus.
Identifiers: Calcium chloride, Cells, Cuticle, Ectodesmata, Foliar, Humidity, Mesophyll, *Oat-M, Radiography, Stomata, Xylem, *Leaves (Oat).

A fraction (12%) of the water from tritium-labeled foliar-applied drops rapidly penetrates through the cuticle and, after transport through the mesophyll, is distributed in an acropetal direction and probably through the xylem, over the oat leaf. The initial rapid penetration is favorably affected by a water 'continuum' that is always formed between tissue and drop, immediately after drop application. It is suggested that the pathway for the creation of this water continuum are the ectodesmata in the guard cells of the stomata. Increasing the CaCl2 concentration of the applied drops has little influence on the water uptake from these drops. Higher salt content of particular parts of the oat leaf increases the water retention by these parts. In the present experimental conditions (60-70% relative humidity) aqueous vapor uptake from the ambient air is small (1.7% of the amounts evaporated), as compared to the uptake from applied drops. Tritium from foliar-absorbed water does not combine with stable compounds (mainly organic) in the leaf.--Copyright 1972, Biological Abstracts, Inc.
W73-10071

ON THE ESTIMATION OF EVAPORATION AND CLIMATIC WATER BALANCE FOR PRACTICAL FARMING, (IN GERMAN),
U. Wendling.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 3, p 199-205. 1972. Illus. English.
Identifiers: *Climatic data, Cover, Equation, *Evaporation, *Farming, Germany, Grass, Precipitation, Water balance.

A 7-yr series of measurements of the potential evapotranspiration of grass-covered areas with maximal water supply is compared with methods of evaporation estimation that are based on meteorological data. The method according to Klatt yields too high values for evaporation. The method according to Turc is most suitable. A simplified form of this equation of estimation is given, which is adapted to the climatic conditions in the German Democratic Republic (GDR). A map with weekly precipitation values and the potential evaportranspiration from the observations made at 35 meteorological stations of the GDR is presented.--Copyright 1973, Biological Abstracts, Inc.
W73-10072

AUTOMATIC WICK IRRIGATION OF POT EXPERIMENTS, (IN GERMAN),
Deutsche Akademie der Landwirschaftswissenschaften zu Berlin (East Germany). Institut fuer Pflanzenzuechtung.
H. Griess.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 3, p 185-198. 1972. Illus. English summary.
Identifiers: *Irrigation methods, *Pot experiments, Wick, Automation.

Different materials, sizes and forms of wicks in pots of different sizes with sand or standard substratum, with or without plants and with different equipment for maintaining a constant water level were tested. Fiberglass wicks that were inserted in the pots from the bottom and whose lower end dipped into a channel with a constant water level, proved to be suitable for automatic irrigation in the optimal range of 60-80% moisture capacity. The desired value may be pricisely adjusted with a variation < 5% moisture capacity via the height between the lower bottom of the pot and the water level. This height depends on the kind of substratum and the height of the pot (height of the substratum) and must be determined once. The stability of the control system is so high that under normal experimental conditions the interfering item 'evapotranspiration' is almost completely balanced over several months. On an average of several pots deviations of less than or equal to plus or minus 5% moisture capacity and in single cases total deviations of less than or equal to plus or minus 10% moisture capacity are to be expected.

Thus wick irrigation is clearly superior to watering. However, wick irrigation is not recommended for the range < 50% moisture capacity. The horizontal uniformity of moisture in the pot was good, while the vertical uniformity was not. Shallow pots are recommended and technical details are described.--Copyright 1973, Biological Abstracts, Inc.
W73-10073

CONSIDERING THE SITE AND THE REACHED LEVEL OF FERTILIZATION WHEN CALCULATING THE OPTIMAL NITROGEN FERTILIZATION OF GRAIN CROPS IN THE MODEL FOR FERTILIZATION SYSTEMS, (IN GERMAN),
Deutsche Akademie der Landwirtschaftswissenschaften zu Berlin, Leipzig (East Germany). Institut fuer Mineraldueng.
O. Hagemann, H. Ansorge, R. Jauert, and H. Goerlitz.
Arch Ackerpflanzenbau Bodenkd. Vol 16, No 2, p 123-132. 1972. English summary.
Identifiers: Crops, *Fertilization, Grain, Irrigation, Models, *Nitrogen fertization, Nutrients, Optimization, Sites.

The optimal N fertilization rates of grain crops that were determined on the basis of optimization calculations, in dependence on the site (with and without sprinkler irrigation) are given. Information is given on N fertilizers of both 'unlimited' and 'limited' availability.--Copyright 1973, Biological Abstracts, Inc.
W73-10074

SUNFLOWER DROUGHT RESISTANCE AT VARIOUS GROWTH STAGES, (IN RUMANIAN),
Institutul de Cercetari Pentru Cereale si Plante Tehnice, Fundulea (Rumania).
L. Pirjol, C. I. Milica, and V. Vranceanu.
An Inst Cercet Pentru Cereale Plante Teh Fundulea Ser C Amelior Genet Fiziol Tehnol Agric. 37, p 191-208. 1969. Illus. English summary.
Identifiers: *Drought, Growth, Seed oil, *Sunflowers, Yield.

The experiments were carried out in a greenhouse, drought being induced for 10 days at different periods (vegetative growth, inflorescence growth, anthesis, seed formation). Drought induced at anthesis proved most detrimental and had irreversible effects, reducing plant metabolic activity and causing a significant yield decrease by forming a small number of flowers with normal development but only partial fertilization. When drought was induced at seed formation, a high number of flowers and seeds developed, but the filling process stagnated, giving high percentage of empty seeds and low seed oil content. This was due to the fact that after the drought a great part of the leaf area dried out. Drought induced during the vegetative growth period was the least detrimental to quantitative and qualitative yield, affecting only growth processes. The plants remained small in size and root, but with a big inflorescence 'SH 53' was more resistant to drought than 'Record'.--Copyright 1973, Biological Abstracts, Inc.
W73-10076

IRRIGATION EXPERIMENTS WITH OIL FLAX 1965-1970,
A. Nordestgaard.
Tidsskr Planteavl. Vol 75, No 6, p 788-792. 1971. English summary.
Identifiers: *Irrigation, *Oil flax, Seed, Straw, Yield, Drought.

Nine irrigation experiments with oil flax on loamy soil were conducted. The effect of drought during growth elongation showed a positive influence on seed yield. Irrigation during this period often influenced seed yield negatively, while the straw yield on the contrary is influenced positively. Drought during and after flowering damaged both seed and straw yield. If maximum seed yield is desired during this period oil flax should be irrigated.--Copyright 1973, Biological Abstracts, Inc.
W73-10077

THE DOWNY MILDEW OF ONION (PERONOSPORA DESTRUCTOR (BERK.) CASP.) IN ISRAEL,
Ministry of Agriculture, Tel-Aviv (Israel).
J. Palti, S. Brosh, M. Stettiner, and M. Zilkha.
Phytopathol Mediterr. Vol 11, No 1, p 30-36. 1972. Illus.
Identifiers: Age, Density, Humidity, Irrigation, *Israel, *Mildew, *Onions, Peronospora-destructor, Plants.

Factors conducive to epidemics of the onion downy mildew include those affecting humidity: stand density, direction of the rows and plant age. Sprinkler irrigation favored the disease more than furrow or trickle irrigation. The number and timing of sprinklings applied in spring to crops sown in autumn or winter greatly influenced the extent of mildew development and yield. On crops sown in Sept.-Oct. the mildew can be expected to appear in late Dec. or early Jan. in years with (a) mean minimum Nov. temperatures not exceeding 12 degrees C and at least 7 rainy days in Oct.-Nov. In fields sown in Nov. the mildew does not usually appear before Feb. Low temperatures in Dec.-Jan. (minima of 3-4 degrees C in the screen) delay development of the disease in winter.--Copyright 1973, Biological Abstracts, Inc.
W73-10083

STUDY OF THE WATER STATUS IN PEA STEMS BY THE METHOD OF SUPERHIGH--FREQUENCY DIELECTRIC MEASUREMENTS, (IN RUSSIAN),
N. N. Ishmukhametova, and A. V. Startseva.
Dokl Akad Nauk SSR Ser Biol. Vol 200, No 4, p 996-998. 1971.
Identifiers: Frequency, Measurements, *Pea stems, *Dielectric measurement.

The water status in pea stems was studied by measuring their dielectric characteristics at superhigh frequencies. Reproduction of the results was very good for specimens with a high water content. The value of the dielectric constant depended on the total water content in the tissue. When measuring the dielectric constant of stems experiencing dehydration, scattering of the data occurred.--Copyright 1973, Biological Abstracts, Inc.
W73-10085

TECHNICAL AND ECONOMIC FACTORS OF VARIOUS TECHNIQUES OF RANGELAND IRRIGATION, (IN RUSSIAN),
A. Ataev, and S. Kerimberdiev.
Probl Osvoeniya Pustyn'. 3, p 66-68. 1972. English summary.
Identifiers: Boreholes, Catchments, Distillation, Economic aspects, *Irrigation, *Rangelands, Techniques, Wells.

Dug wells, boreholes, artificial water catchment sites, water transportation by tankers and distillation installations are discussed and compared.--Copyright 1973, Biological Abstracts, Inc.
W73-10090

IRRIGATION TRIALS WITH ONIONS,
Horticultural Research Inst., Pretoria (South Africa).
F. J. Van Eeden, and J. Myburgh.
Agroplantae. Vol 3, No 4, p 57-62. 1971.
Identifiers: *Irrigation practices, *Onions-M, Plants, Spacing, Trials, Soils, Evaporation.

A good yield was obtained if water was applied whenever 60% of the available moisture in the 0-30 cm soil-zone had been depleted. Yield was depressed by allowing the soil moisture depletion to reach 90% of the available moisture during the second half of the growing season. The yield loss as a result of the dry regime was, to a certain extent, compensated for by using a narrow spacing of 22.9 cm (9 in.) between rows instead 38.1 cm (15 in.). A good yield/unit water applied was obtained with a close spacing combined with a dry regime. Irrigation scheduling according to evaporation from the Class A pan is possible under local irrigation practices. It is recommended that the following Esubt/Esubo-ratios (Et ± soil moisture depletion from top soil, Eo ± pan evaporation) be used for each consecutive 2-weekly period after transplanting: 0.3; 0.4; 0.5; 0.6 and 0.7 for the rest of the growing season.--Copyright 1972, Biological Abstracts, Inc.
W73-10139

METHODS OF ALFALFA IRRIGATION UNDER CONDITIONS OF HIGH GROUNDWATER TABLE, (IN BULGARIAN),
Academy of Agricultural Sciences, Pazardzhik (Bulgaria). Experiment Station of Irrigated Agriculture.
L. Delchev.
Rasteniev'd Nauki. Vol 9 No 1, p 51-61. 1972. Illus.
Identifiers: *Alfalfa, Groundwater, *Irrigation methods, Water table.

Watering by gravity in strips in a soil with an 80-100 cm deep active soil layer, sprinkling in the same type of soil, and sprinkling in soil with a 50 cm deep soil level were compared with a non-irrigated culture of alfalfa. Irrigation considerably increased growth. The first variant of the experiment with gravity flow seemed best.--Copyright 1973, Biological Abstracts, Inc.
W73-10169

TECHNICAL AND ECONOMICAL EFFICIENCY OF FORAGE PLANT CULTIVATION IN KAZAKHSTAN IRRIGATED DESERT RANGES (IN RUSSIAN),
N. V. Danil'chenko.
Probl Osvoeniya Pustyn'. 1. p 56-61. 1972. English summary.
Identifiers: Alfalfa, Corn, Cultivation, Deserts, Economics, *Fertilizers, *Forage plants, Grass, Irrigation, *Kazakhstan, Plant, Ranges, Silage, Sudan.

Under desert conditions 100-120 c/ha of alfalfa dry hay, 400-500 c/ha of corn silo and 90-100 c/ha of sudan can be obtained from an irrigated hectare treated with manure (20-30 ton/ha) and mineral nutrients (5-6 c/ha). The presowing moisture content of the root layer must not be less than 50-60% of saturation.--Copyright 1973, Biological Abstracts, Inc.
W73-10170

INFLUENCE OF THE GROWING NITROGEN DOSES ON THE YIELDS OF MIXTURES OF LUCERNE WITH GRASSES AS WELL AS ON THOSE OF LUCERNE AND GRASSES IN PURE CULTURES, (IN POLISH),
Instytut Uprawny Nowozenia i Gleboznawstwa, Baborow (Poland).
H. Burczyk, W. Cwojdzinski, and E. Naglik.
Pamiet Pulawski. 52, p 159-181. 1972. Illus. English summary.
Identifiers: Brome grass, Cocksfoot, Cultures, *Grasses, Growing, *Lucerne, Mixtures, *Nitrogen fertilizers, Nutrients, Oat grass, Rainfall, Yield, Yields.

Three series of experiments on the fertilizing of mixtures of lucerne with grasses as well as of grasses (cocksfoot, awnless brome and oat grass) and lucerne 'Miechowska' in pure culture were

carried out. The following N doses were applied: 0, 120, 240, 360 and 480 kg/ha on the constant background of P (64 P2O5 kg/ha and K (160 K2O kg/ha). The nutrient uptake was greater in wet years than in the dry ones. When rainfall during the vegetation period was sufficient, the yield of grasses intensively fertilized with N was equal to that of the mixture. Under conditions of seasonal drought the yields of the mixture were higher.--Copyright 1973, Biological Abstracts, Inc.
W73-10171

THE USE OF NUCLEAR TECHNIQUES IN SOIL, AGROCHEMICAL AND RECLAMATION STUDIES. (PRIMENENIE METODOV ATOMNOI TEKHNIKI V POCHVENNO-AGROKHIMICHESKIKH I MELIORATIVNIKH ISSLEDOVANIYAKH),
Moskovskaya Selskokhozyaistvennaya Adademiya (USSR).
For primary bibliographic entry see Field 02G.
W73-10187

MONITORING THE WATER UTILIZATION EFFICIENCY OF VARIOUS IRRIGATED AND NON-IRRIGATED CROPS, USING NEUTRON MOISTURE PROBES (CONTROLE DE L'UTILISATION ET DE L'EFFICIENCE DE L'EAU CHEZ DIVERSES CULTURES IRRIGUEES OU NON, AU MOYEN D'HUMIDIMETRES A NEUTRONS),
C. Maertens, and J.-R. Marty.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Application in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972. p 621-630. 6 fig, 3 ref.

Descriptors: *Soil moisture meters, *Radioactivity techniques, *Water requirements, *Agronomic crops, Irrigation, Crop response, Corn (Field), Sorghum, Fescues, Alfalfa, Soybeans, Clovers.

Efficiency of water utilization (quantity of dry matter produced/volume of water consumed) was measured for various crops (meadow fescue, Italian rye grass, alfalfa, corn, sorghum, soya, and sunflower) in southwestern France, using a neutron moisture meter to determine soil moisture in-situ. The efficiency decreased in summer as compared with spring in connection with increased transpiration in the instance of rye-red clover but was unchanged for alfalfa. For fescue meadows, the efficiency was increased by irrigations; but when transpiration exceeded 3 mm/day, the efficiency dropped with increasing deficiency of climatic moisture. The summertime efficiency was better for corn and sorghum than for fescue meadows. The soil moisture available to certain plants was decreased by the relatively shallow root structure resulting when these plants were irrigated. For corn the availability of soil moisture was decreased 25-30% throughout the summer months; for sorghum, sunflower, and soya, the reduction was 50% for early September. (See also W72-10679) (Bopp-ORNL)
W73-10195

OPTIMISATION OF SAMPLING FOR DETERMINING WATER BALANCES IN LAND UNDER CROPS BY MEANS OF NEUTRON MOISTURE METERS (OPTIMISATION DE L'ECHANTILLONNAGE POUR DETERMINER LES BILANS HYDRIQUES SOUS CULTURE AU MOYEN DE L'HUMIDIMETRE A NEUTRONS),
Institut Technique des Cereales et Fourrages, Paris (France).
P. Peyremorte, G. Philippeau, and J. Marcesse.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 631-647. 6 tab.

Descriptors: *Radioactivity techniques, *Agronomic crops, *Soil moisture meters, *Water requirements, Underground, Water balance, Statistical methods, Variability, Reliability, On-site tests, Instrumentation, Soil analysis, Optimization, Non-destructive tests, Testing procedures, Cultivation, Alfalfa, Sorghum, Corn (Field), Soil water.

Work at the Greoux agricultural research station showed the importance of a representative sampling to account for the heterogeneous nature of the soil-water-plant medium. Optimization of equipment use was achieved, reducing the counting time from about 1 minute to 20 seconds and increasing the number of measuring points. Horizontal implantation of the tubes to provide access of the neutron meter to underground locations was advantageous as compared to vertical emplacement since less interference with cultivation resulted and since the installation labor was reduced 50%. Tube lengths of tens of meters may be used to traverse several experimental plots or for large plots such as vineyards or orchards. A precision within 10 mm moisture with 95% probability resulted using 3 horizontal tubes at 20, 60, and 100 cm depths. The use of vertically emplaced tubes required 12 to achieve the same precision. Analyses of variance are given for water balances for alfalfa, sorghum, corn, and sunflower crops. (See also W72-10679) (Bopp-ORNL)
W73-10196

GROUND MOISTURE MEASUREMENT IN AGRICULTURE (BODENFEUCHTEMESSUNG IN DER LANDWIRTSCHAFT),
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
H. Dreiheller.
Available from NTIS, Springfield, Va., as EURISOTOP-67; $4.00 in paper copy, $0.95 in microfiche. Report EURISOTOP-67, May 1972, 32 p, 15 fig, 10 ref.

Descriptors: *Soil moisture meters, *Neutron absorption, *Radioactivity techniques, *Irrigation, Water table, Soil-water-plant relationships, Instrumentation, Gamma rays, Root zone, Water requirements, Analytical techniques, Reviews, Research and development.

Advantages are indicated of radiometric techniques over classical methods in irrigation studies for measurement of (1) average soil moisture over 0-60 cm depth, (2) groundwater at greater depth, and (3) soil moisture at the depth of the root zone of various plants. Neutron meters are generally preferable to density measurements using gamma radiation and are suitable for automatic recording and control. Special designs give resolution in the depth ranges of plant root zones. An equilibration time that is required by other methods is not involved in the neutron-meter measurement of water table, and a separate accounting of the soil porosity is not required. (Bopp-ORNL)
W73-10209

REMOTE CONTROL OF IRRIGATION SYSTEMS,
Akademiya Nauk Kirgizskoi SSR, Frunze. Institut Automatiki i Telemekhaniki.
V. I. Kurotchenko, and N. I. Babanin.
Available from the National Technical Information Service as TT N-53085 , $3.00 in paper copy, $0.95 in microfiche. Translation from Russian prepared for the National Science Foundation and Dept. of Interior, Bureau of Reclamation, by Dr. Ismail Saad. 1971. 164 p, 58 fig, 13 tab, 73 ref.

Descriptors: *Irrigation systems, *Irrigation engineering, Sprinkler irrigation, Irrigation operation and maintenance, *Mathematical models, Analytical techniques, *Telemetry, *Remote control, Automatic control, Installation, Equipment, Instrumentation.
Identifiers: U.S.S.R.

A pulse-code device, labelled BKT-62, for telemetering technological parameters in irrigation systems was constructed in 1962. In addition to metering the levels, it also positions the sluices at irrigation headworks. Fifteen time channels are required for the transmission of telemechanical information, achieved by means of a selected 2-line cable and using step-by-step synchronization. Experimental tests with sprinklers over a 20-month period to 1965 were conducted under different conditions, with the system functioning satisfactorily in the execution of over 50 million measurements. The work was not affected by fluctuations either in the supply lines or in temperature variations from -20 degrees C to more than 50 degrees C. This detailed description of the complicated components of the system is illustrated with numerous figures, equations, and specifications. (Paylore-Arizona)
W73-10214

INFLUENCE OF TEMPERATURE AND PRECIPITATION ON THE DEVELOPMENT OF GROWTH PHASES OF MILLET (PANICUM MILIACEUM L.), (IN CZECH),
Vyzkumny Ustav Rastlinnej Vyroby, Piestanoch (Czechoslovakia).
J. Sinska.
Ved Pr Vysk Ustavu Rastlinnej Vyroby Piestanoch. 9. p 35-42. 1971. English summary.
Identifiers: Growth, *Millet (Growth), Panicum-Miliaceum, *Precipitation (Atmospheric), *Temperature.

Cool dry weather lengthened the period from emergence to flowering. Cultivars with a longer vegetation period were more affected. Higher than average temperature and high precipitation lengthened the period from emergence to flowering, but the length of the vegetation period as a whole was considerably shorter than for cool, dry years.--Copyright 1973, Biological Abstracts, Inc.
W73-10224

EFFECT OF WATER SUPPLY ON THE DAILY WATER CONSUMPTION OF COTTON OF THE SPECIES GOSSYPIUM HIRSUTUM L. AND GOSSYPIUM BARBADENSE L. (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent, Inst. of Experimental Plant Biology.
Kh. S. Samiev, and O. T. Kurbaev.
Uzb Biol Zh. Vol 15, No 6, p 14-16, 1971.
Identifiers: *Cotton, Daily, Gossypium-Barbadense, Gossypium-Hirsutum, Species, *Water uptake (Plants), Biomass.

Irrespective of the water supply Upland cotton (G. hirsutum) consumes more water daily than Sea Island cotton (G. barbadense) up to the end of flowering. The biomass accumulates more intensely in the former species than in the latter up to the end of flowering. Thereafter daily water consumption is higher in G. barbadense than in G. hirsutum.--Copyright 1973, Biological Abstracts, Inc.
W73-10229

PHOTOSYNTHESIS PRODUCTIVITY OF THE COTTON PLANT, VARIETY 152-F, DEPENDING ON THE LEVEL OF WATER SUPPLY, (IN RUSSIAN),
Akademiya Nauk Uzbekskoi SSR, Tashkent. Inst. of Experimental Plant Biology.
Kh. S. Samiev, E. E. Uzenbaev, and U. S. Sidikov.
Uzb Biol Zh. Vol 15, No 5, p 17-19. 1971.
Identifiers: *Cotton, Cultivars, Moisture, *Photosynthesis, Plant productivity, Soils, Water supply, Irrigation moisture.

In serozem soils with a low groundwater level, best productivity was obtained when irrigation moisture was maintained at a level not lower than 60% of the moisture capacity of the field.--Copyright Biological Abstracts, Inc.
W73-10230

THE EFFECT OF HERBICIDE ON THE DEVELOPMENT OF WHEAT VARIETIES AND THEIR CLIMATIC ECOLOGICAL BEHAVIOR, (IN HUNGARIAN),
University of Agriculture, Debrecen (Hungary). Novenytani Novenyelettani Tansz.
G. Mandy.
Bot Kozl. Vol 58, No 4, p 221-227. 1971. Illus. English summary.
Identifiers: Climatic conditions, Ecological studies, Flowering, *Herbicides, Metoxuron, Ripening, Straw, *Wheat cultivers, *Doseanex.

The effect of the herbicide Dosanex (metoxuron) on 3 winter wheat cultivars, (Bezostaya 1., Fertodi 293., and Multibraun) under extreme weather conditions was studied. Dosanex eradicated the wheat population under unfavorable weather conditions and had a strong effect on the ecological capacity for adaptation. The Dosanex treatment increased the phenological phenomena causing an uneven ripening. The herbicide also decreased the length of straw by 5-19%.--Copyright 1973, Biological Abstracts, Inc.
W73-10244

WESTLANDS WATER DISTRICT.
For primary bibliographic entry see Field 06E.
W73-10274

CULTIVATION OF CARP IN RICE PADDIES OF WESTERN FERGANA AND THE EFFECT OF FISH ON RICE YIELD, (IN RUSSIAN),
E. A. Tashpulatov.
Uzb Biol Zh. Vol 15, No 6, p 62-63, 1971.
Identifiers: *Carp cultivation, Cyprinus-carpio, *Fergana, Fish, Paddies, *Rice paddies, Stocking, USSR, Yield.

Experiments demonstrated that one of the ways to increase the yield of rice is to grow yearling carp (Cyprinus carpio) in the paddies at a stocking rate of 500-550 fishes/ha.--Copyright 1973, Biological Abstracts, Inc.
W73-10359

ON THE POSSIBILITES OF GROWING TOMATO PLANTS FOR INDUSTRIAL PURPOSES IN ANGOLA: A GRAPHIC ANALYSIS, (IN PORTUGUESE),
P. Martins, and A. Carlos.
Rev Agron (Lisb). Vol 53, No 1, p 11-28, 1970. Illus. English summary.
Identifiers: *Angola, Climates, *Graphic analysis, Plants, Rainfall, Temperature, *Tomato.

Several meteorological stations of Angola were studied in order to determine if the weather would be favorable for growing processing tomatoes. The following climatic conditions are suitable for successful growth: 2 or 3 dry months average monthly maximum temperature under 30C and average monthly minimum temperature over 12C. Vila Arriaga appears to have favorable conditions, in Vila Pereira d'Eca the dry season is too cold, in Luanda, Carmona and Cela low sunlight and blight diseases are problems, in Cela, Nova Lisboa, Luso e Sa' da Bandeira the dry season is too short and cold and in Forte Rocadas it may be too cold at times.--Copyright Biological Abstracts, Inc.
W73-10362

CORRELATIONS BETWEEN NITROGEN FERTILIZATION AND SPRINKLER IRRIGATION WITH FORAGE CROPS OF SEVERAL CUTS GROWN ON HEAVY SOILS, (IN GERMAN),
D. Roth.
Arch Acker-Pflanzenbau Bodenkd. Vol 16, No 2, p 149-159, 1972. Illus. English summary.
Identifiers: Clay, Crops, *Fertilization, Forage, Grasses, Irrigation, Legumes, *Nitrogen fertilizer, Soils, *Sprinkler irrigation.

Combined N fertilization and sprinkler irrigation experiments with intensively used grassland, legume-grass-mixtures and field grass were carried out on 3 sites with heavy soils (>30% clay). Increasing rates of N application resulted in substantial yield increase with all the tested forage crops. In case of pure field grass, sprinkler irrigation led to considerably higher surplus yields than with legume-grass-mixtures and grassland. A positive correlation between additional water supply and N fertilization was found with pure grass stands only.--Copyright 1973, Biological Abstracts, Inc.
W73-10369

PATCHES IN CULTIVATED SPECIES IN THE CENTRAL REGION OF SANTA FE PROVINCE. I. SOIL-CLIMATIC FACTORS, (IN SPANISH),
J. L. Panigatti, A. Pineiro, and F. P. Mosconi.
Rev Invest Agropecu Ser 3 Clima Suelo. Vol 8, No 4, p 141-154, 1971. Illus. English summary.
Identifiers: *Argentina (Santa Fe), Crops, Patches, Species, Yield, *Water balance, *Soil-climatic factors (Crops).

Water balance in the area, and the influence that external (climate) and internal (soil) factors have in water economy and crop development were important. Those factors may produce patches in the crops with significant differences in quality and quantity in the crop yield.--Copyright 1973, Biological Abstracts, Inc.
W73-10383

INFLUENCE OF ATMOSPHERIC PRECIPITATION, MEAN TEMPERATURE AND RELATIVE HUMIDITY OF AIR ON CROP OF GRAIN, STRAW AND ON TECHNOLOGICAL VALUE OF SPRING BARLEY, (IN CZECH),
Vyzkumny Ustav Raslinnej Vyrbby, Piestanoch (Czechoslovakia).
J. Kandera.
Ved Pr Vysk Ustavu Rastlinnej Vyroby Piestanoch. No 9, p 147-154, 1971. English summary.
Identifiers: Crops, Grain, Humidity, Mean temperature, *Precipitation (Atmospheric), *Relative humidity, Spring barley, Straw, Temperature, *Fertilization.

The influence of increased rates of N together with normal fertilization with P2O5 and K2O was investigated over a 6 yr period using 'Slovensky 802' introduced into the crop rotation after sugarbeet fertilized by manure on soils of degraded czernozem. The results of 12 combinations of fertilizing were evaluated as a whole in the relation to atmospheric precipitations, mean temperatures and to the relative humidity of the air during the vegetation period by computing correlation coefficients. Positive, significant correlations were seen between the atmospheric precipitation and the waste (size of the grains under 2.2 mm), between mean temperature in deg.C and grain to straw ratio, the hectolitre weight of the grain, the absolute weight of the grain, the size of grain with a diameter of 2.5 mm, the starch content and the malt extract. A significant positive correlation was also seen between relative air humidity and absolute weight of the grain, the protein and starch content.--Copyright 1973, Biological Abstracts, Inc.
W73-10388

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

THE HYDROLOGY OF FOUR SMALL SNOW ZONE WATERSHEDS,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 02A.
W73-09765

A NEW METHOD OF DETECTING LEAKS IN RESERVOIRS OR CANALS USING LABELLED BITUMEN EMULSIONS,
Centre d'Etude de l'Energie Nucleaire, Grenoble (France).
For primary bibliographic entry see Field 08G.
W73-09770

HYDROLOGIC IMPLICATIONS OF THE SAN ANGELO CUMULUS PROJECT,
Texas A and M Univ., College Station. Dept. of Meteorology.
For primary bibliographic entry see Field 02A.
W73-09777

SOME PROBLEMS IN THE CONSTRUCTION OF RESERVOIRS IN THE USSR (NEKOTORYYE PROBLEMY SOZDANIYA VODOKHRANILISHCH V SSSR),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 06G.
W73-09803

PRESENT AND FUTURE WATER AND SALT BALANCES OF SOUTHERN SEAS IN THE USSR (SOVREMENNYY I PERSPEKTIVNYY VODNYY I SOLEVOY BALANS YUZHNYKH MOREY SSSR).
State Oceanographic Inst., Moscow (USSR).
For primary bibliographic entry see Field 02H.
W73-09807

SHORT-RANGE FORECAST OF MAXIMUM FLOOD DISCHARGES ON THE KYZYLSU RIVER AND ITS TRIBUTARIES (KARATKOSROCHNYY PROGNOZ MAKSIMAL'NYKH RASKHODOV PAVODKOV NA R. KYZYLSU I YEYE PRITOKAKH),
Yu. I. Lisitsyn.
Meteorologiya i Gidrologiya, No 10, p 100-101, October 1972. 3 ref.

Descriptors: *Flood forecasting, *Flood discharge, *Peak discharge, *Rivers, *Tributaries, Air masses, Meteorology, Synoptic analysis, Orography, Probability, Equations.
Identifiers: *USSR, *Tadzhikistan, *Kyzylsu River.

A method is described for preparing a short-range forecast of maximum flood discharges on the Kyzylsu River in southern Tadzhikistan. The basis for the forecast is the aerosynoptic method, which considers the characteristics of air masses and the wetting indices of the river basin. The probability of achieving the allowable forecast error is 78%. (Josefson-USGS)
W73-09809

INTERNATIONAL HYDROLOGICAL DECADE (MEZHDUNARODNOYE GIDROLOGICHESKOYE DESYATILETIYE),
For primary bibliographic entry see Field 02E.
W73-09810

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN,
Duncan and Jones, Berkeley, Calif.; and Yoder-Trotter-Orlob and Associates, Berkeley, Calif.
For primary bibliographic entry see Field 06D.
W73-09828

A MARGINAL ANALYSIS - SYSTEM SIMULATION TECHNIQUE TO FORMULATE IMPROVED WATER RESOURCES CONFIGURATIONS TO MEET MULTIPLE OBJECTIVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W73-09832

REPLICATION MODELING FOR WATER-DISTRIBUTION CONTROL,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
H. D. Gilman, M. Y. Goodman, and R. DeMoyer, Jr.
Journal of the American Water Works Association, Vol 65, No 4, p 255-260, April 1973. 4 fig, 1 tab, 4 ref, 2 appen.

Descriptors: *Water distribution (Applied), *Control, *Simulation analysis, *Regression analysis, Mathematical models, Systems analysis, Pumping plants, Pipes, Pressure, Measurement, Computer models.
Identifiers: *Replication modeling, *Network analysis, *Inverse solution, Tanks.

When a computer makes decisions concerning the control of a water distribution system, it must first replicate and then evaluate field status on the basis of highly limited field-monitoring data. Presented are some approaches to r eplication modeling and the problems associated with each. Two types of replication modeling techniques that take into account the limited measurements available for control are discussed in detail, and are compared as to typical merits and disadvantages concerning data requirements, adaptability to water distribution system changes, computer solution speed, ability to monitor unmeasured points, detection of improper valve settings, effect of instrumentation errors, and suitability for design studies. The first technique for solving the network-balance problem is an approach to convert the limited data into a complete set of takeoffs so a full-scale-network model can be brought into agreement with the real world; it is called the inverse solution technique. The second approach is empirical, being based on a regression analysis of operational monitoring data accumulated over time. A residential, water-pressure district of Philadelphia is studied for purposes of analysis. (Bell-Cornell)
W73-09833

OPTIMAL CONTROL OF MULTI-UNIT INTER--BASIN WATER-RESOURCE SYSTEMS,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
K. Takeuchi.
Dissertation submitted to: Department of City and Regional Planning, University of North Carolina, Chapel Hill, North Carolina, p 1-160, March 1972. 17 fig, 18 tab, 50 ref, 3 appen.

Descriptors: Water resources, *Systems analysis, *Optimization, *Linear programming, *Dynamic programming, *Simulation analysis, Methodology, Analytical techniques, Water shortage, Reservoirs, Basins, Streamflow, Estimating, Equations, Algorithms.
Identifiers: *Optimal control rules.

The merits and shortcomings of simulation and mathematical programming techniques for finding optimal control rules of water resources systems are examined, and a new methodology is presented that extends prior work of others, especially the extension to realistically complex systems. The case study approach, applied to a prospective system to serve the needs of several urbanizing areas in the Piedmont of North Carolina is employed to demonstrate the practicality of methods developed. In the mathematical modeling stage, problem reduction techniques are considered and a preliminary set of rational simplification theories are constructed. Then, the problem of finding appropriate decisions that minimize current and expected future losses to economic efficiency within each month is formulated as a convex piecewise-linear programming problem. That mathematical problem contains an unknown function of end-of-month reservoir levels that yields the expected future losses. To estimate that unknown function, the linear programming is coupled with the backward algorithm of dynamic programming; the resultant problem is referred to as a DCL problem. Two computational procedures for obtaining approximate solutions based on the DCL technique are applied to the resource system under investigation, and their theoretical and computational soundness is tested by simulation. The DCL technique is concluded to be practical for realistic systems and to be satisfactory in achieving the objectives of the dissertation. (Bell-Cornell)
W73-09835

CONTROL OF THE OPERATING REGIMES OF WATER RESOURCES SYSTEMS,
A. Sh. Reznikovskii.
Hydrotechnical Construction, No 1, p 56-61, January, 1972. 7 p, 11 ref. Translated from Gidrotekhnicheskoe Stroitel'stvo, No 1, p 34-37, January, 1972.

Descriptors: *Water management (Applied), *Multiple-purpose reservoirs, *Operation and maintenance, *Methodology, *Hydroelectric plants, River basins, Optimum development plans, Comprehensive planning, Hydraulics, Economics, Reservoir releases, Streamflow, Water consumption, Equations.
Identifiers: *Optimal control rules, Probabilistic method, Distribution curves, *USSR.

Formation and development of large water resources systems characterize a relatively new phase of water management in the Soviet Union, including the operation, construction, and design of reservoirs which adapt the nonuniform and asynchronous flow of different river systems to the time-variable demands of the different water users of the system. At present, comprehensive plans have not yet been developed for operating large reservoir systems covering entire river basins. The combined operation of several reservoirs provides increases in the guaranteed yield of the reservoirs and in the effective utilization of streamflow. However, difficulties in creating a methodology for formulating optimal control rules arise from a present lack of probabilistic descriptions of streamflow variations and water consumption, and in the evaluation of economic characteristics which constitute a special-purpose function to optimization, wherein it is necessary to accomplish a complex analysis of not only the multiple-purpose water resources system, but also of several allied systems (power, transport, etc.). This article examines some aspects of the methodology for formulation of control rules for the regimes of systems of reservoirs of hydroelectric plants operating in an energy system and satisfying the given requirements of the participants in the water management complex. (Bell-Cornell)
W73-09868

AN INVESTIGATION INTO THE LONGTERM PERSISTENCE OF U. S. HYDROLOGIC RECORDS,
IBM Watson Research Center, Yorktown Heights, N.Y.
J. R. Wallis.
Available from the National Technical Information Service as PB-220 738, $4.50 paper copy, $0.95 microfiche. Completion Report, January 1973. 54 p, 7 fig, 42 ref. OWRR C-3135 (3691) (1).

Descriptors: *Reservoir yield, *Hydrologic data, Seasonal, *Synthetic hydrology, Long-term planning, Regional analysis, *Monte Carlo method, *Stochastic processes, Optimum development plants.
Identifiers: ARIMA process, Fractional noises, Rescaled range.

Longterm persistence in hydrologic records influences the concept of reserovir firm yield. This study attempted to assess regional and seasonal persistence in U. S. hydrologic records. The attempt was not successful because of the nature of the hydrologic data base and the power of the relevant statistics to separate longterm from shorterm persistence given records of normal hydrologic length.
W73-09869

WATER RESOURCES DEVELOPMENT IN THE MULLICA RIVER BASIN PART II: CONJUNCTIVE USE OF SURFACE AND GROUNDWATERS OF THE MULLICA RIVER BASIN,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 04B.
W73-09870

MOVABLE DAM AND METHOD OF OPERATION,
For primary bibliographic entry see Field 08A.
W73-09938

WATER REGIME OF THE BANK SANDS OF KURTLI STORAGE LAKE, (IN RUSSIAN),
A. Nurmukhamedov.
Probl Osvoeniya Pustyn'. 1, p 71-74. Illus. 1972. English summary.
Identifiers: Banks, Cultivation, *Desert shouls, *Kurtli storage, Lake, Sands, *Mesophyte trees, USSR.

The banks consist of fine-grained, non- and weakly saline sands. The underground water depth varies from 0.7-5.0 m according to season. The water regime of the root soil horizons depends upon the ground water depth and the rainfall. These areas may be used for cultivation of desert shrubs and mesophyte tree species.--Copyright 1973, Biological Abstracts, Inc.
W73-09980

HOW FREQUENTLY WILL FLOODS OCCUR,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
B. M. Reich.
Water Resources Bulletin, Vol 9, No 1, p 187-188, February 1973. 1 fig, 2 ref.

Descriptors: *Flood forecasting, *Probability, *Planning, *Flood frequency, *Flood recurrence interval, Flood protection, Water management (Applied), Warning systems, Floods, Flood discharge.

It has become customary for engineers to refer to floods in terms of their return period or recurrence interval. While this common practice provides a means for comparing the relative severity of floods on different sized rivers, it often leads to misunderstandings. The only simple interpretation of return period is that its reciprocal is the probability of obtaining a flood that size or greater in any one year. Thus the 100-year flood peak has a probability of being exceeded in any one year of 0.01. It is necessary to consider the probability that the selected flood discharge will be exceeded in 25, 50 years, or another design lifetime. For in-

stance, there is a probability of 0.22 that the 100-year flood will be exceeded at least once in 25 years. The percentage change of getting floods of that or higher levels during a 100-year design lifetime is 64%. A table gives up to five equivalent interpretations for a specific return period. Lifetimes from 1 to 100 years are considered. Return periods are spaced according to the commonly used extreme value paper of Powell or Gumbel. Besides their use on graph paper for plotting observed floods and an extrapolated frequency curve, the values could provide the basis for a table in which estimates are given in terms of the discharge of progressively rarer events. Alternatively flood elevations or costs of alternative protection schemes could be listed alongside these six columns. Decision makers could see at a glance the change of failure over various planning horizons for all options proposed. (Knapp-USGS)
W73-09992

RIVER THAMES--REMOVABLE FLOOD BARRIERS,
Bruce White, Wolfe Barry and Partners, London (England).
For primary bibliographic entry see Field 08A.
W73-09996

NAVIGATION ON THE THAMES,
Port of London Authority (England).
For primary bibliographic entry see Field 08A.
W73-09999

RAIN-FOREST CONSERVATION IN AFRICA,
T. T. Struhsaker.
Primates. Vol 13, No 1, p 103-109. 1972. Illus.
Identifiers: *Africa, *Conservation, Forests, *Rain forests, Ecosystem.

Outlined are some of the causes of rain-forest ecosystem destruction in Africa, reasons why it should be conserved, brief descriptions of a few specific forests and suggestions on how forest conservation might be implemented.--Copyright 1972, Biological Abstracts, Inc.
W73-10016

HYDRO-POWER SYSTEM SIMULATION TECHNIQUE,
Corps of Engineers, Portland, Oreg. North Pacific Div.
C. E. Abraham.
Water Resources Bulletin, Vol 9, No 1, p 34-40, February, 1973. 3 fig, 1 plate, 5 ref.

Descriptors: *Simulation analysis, *Computer programs, *Reservoirs, *Regulation, *Multiple-purpose projects, *Hydrologic systems, Scheduling, Hydroelectric power, Dams, Columbia River, Optimum development plans, Project benefits, Grand Coulee Dam, Systems analysis, Mathematical models.
Identifiers: Operating constraints.

The non-power requirements of a large hydropower system of multiple-purpose projects often conflict with the best power peaking operation. In order to schedule an optimum multiple-purpose operation, advanced procedures that necessitate computers are required. One of the family of programs used by the North Pacific Division of the Corps of Engineers for its reservoir regulation and power scheduling activities is described. This program, Hydro-Power System Regulation Analysis, is used to regulate the Columbia System of hydro projects, and is designed for short incremental time periods from one hour to one day. Special techniques are used in a computer program that provide the ability to define operating constraints in order of priority. Emphasis is given to rapid turn-around time yielding the maximum useful information while requiring as little manual input as possible. These techniques are easily adapted to practical reservoir regulation problems so that the program is useful in daily reservoir regulation scheduling. (Bell-Cornell)
W73-10019

MATERIALS OF THE ANNIVERSARY SESSION OF THE ACADEMIC COUNCIL (MATERIALY YUBILEYNOY SESSII UCHENOGO SOVETA).
Kazakhskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Alma-Ata (USSR).
For primary bibliographic entry see Field 02A.
W73-10048

THE UTILIZATION OF BOGS IN CZECHOSLOVAKIA,
H. Broekke.
Tidsskr Skogbruk. Vol 79, No 2, p 214-228. 1971. Illus.
Identifiers: *Bogs, *Czechoslovakia, Water utilization, Forestry, Timber industry.

Czechoslovakia has about 2000 bogs with a total of 33,000 ha, which is not much compared with northern countries. However, due to industry's pressure on resources, much scientific and practical interest is devoted to bog lands. The Czechs consider production of quality timber and the forest's social significance as the basis of their forestry.--Copyright 1972, Biological Abstracts, Inc.
W73-10131

DESCRIBING ARIZONA SNOWPACKS IN FORESTED CONDITION WITH STORAGE-DURATION INDEX,
Arizona Univ., Tucson. Dept. of Watershed Management.
For primary bibliographic entry see Field 02C.
W73-10152

PROPER USE AND MANAGEMENT OF GRAZING LAND.
Arizona Interagency Range Committee.

1972. P 48, 7 FIG, 3 TAB.

Descriptors: *Range management, *Grazing, *Wildlife management, *Arizona, *Natural resources, Land use, Grasses, Forage grasses, Livestock, Cost-benefit analysis, Carrying capacity, Droughts.

The first of a series of publications to be issued by an interagency committee composed of federal, state and University personnel, this one begins by recognizing the proper use of Arizona's grazing lands that now make up a large percentage of the State's land area. Since at present most of this land is producing vegetation far below its carrying capacity, the Committee has addressed itself to a consideration of the following topics: plant factors and proper grazing use, animal factors bearing upon proper use, procedures for determining grazing use, and practices to facilitate proper use. The figures show the growth of various species, effect of clipping, seasonal livestock gains, and a cost-return evaluation of proper range use. Practices recommended to effect proper use include development features such as wells, ponds, and pipelines; plant control, seeding, fire, and fertilization; and control of human use to minimize disruptions detrimental to proper use. (Paylore-Arizona)
W73-10211

A PRELIMINARY LIST OF INSECTS AND MITES THAT INFEST SOME IMPORTANT BROWSE PLANTS OF WESTERN BIG GAME,
Forest Service (USDA), Moscow, Idaho. Forestry Sciences Lab.
For primary bibliographic entry see Field 02I.
W73-10218

PRELIMINARY ANNOTATED LIST OF DISEASES OF SHRUBS ON WESTERN GAME RANGES,
Forest Service (USDA), Ogden, Utah. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 02I.
W73-10219

SUBTERRANEAN PART CHARACTERISTICS OF SOME NATURAL GRASS COMMUNITIES ON EROSIVE SLOPES, (IN RUSSIAN),
Avademiya Nauk Litovskoi SSR, Vilnius. Inst. of Botany.
N. A. Lapinskene.
Liet Tsr Moksiu Akad Darb Ser B. 3 p 13-24. 1971. Illus. English summary.
Identifiers: Agrostis-tenuis, Anthoxanthum-odoratum, Briza-media, *Erosive slopes, Festuca-ovina, Festuca-rubra, *Grass, Hieracium-pilosella, Medicago-lupulina, Moisture, Morphology, Nutrition, Poa-angustifolia, Poa-compressa, Roots, Soils, Trifolium-medium, Trifolium-montanum, Weather, *Lithuania.

In 1965-1966 the communities typical of erosive slopes in Ignalina district (Northeast Lithuania) and in Silale district (West Lithuania), Anthoxanthum odoratum + Agrostis tenuis, Anthoxanthum odoratum + Briza media, Festuca ovina-Trifolium montanum, F. ovina + Hieracium pilosella, Festuca rubra-Medicago lupulina, F. rubra + Agrostis tenuis, Poa angustifolia + F. rubra, Poa compressa-Trifolium medium were investigated. The interrelations between the subterranean part of these communities and the soils which are reflected by the morphological properties of the roots and by the distribution of their mass in separate horizons of sod-podzolic loam and sandy loam soil were established. The subsurface part of the communities was influenced by the physical and chemical properties of the soil. Dryness and a bad water-weather-nutritional status in the deeper soil horizons have a negative influence. The main mass of the subsurface part of the investigated communities is in the surface humic horizon, in the depth of 0-20 cm, where it forms turf of about 3 cm thick. It strengthens the soil against the erosion. Only separate individual plant roots penetrate to the depth of 50-100 cm.--Copyright 1973, Biological Abstracts, Inc.
W73-10245

SIMON RUN WATERSHED PROJECT, POTTAWATTAMIE COUNTY, IOWA (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Des Moines, Iowa.
For primary bibliographic entry see Field 04D.
W73-10263

RESTORATION OF HISTORIC LOW FLOW DIVERSION TO ARROYO COLORADO; LOWER RIO GRANDE FLOOD CONTROL PROJECT, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Dallas, Tex. Southwestern Div.

Available from National Technical Information Service, U.S. Dept. of Commerce as EIS-TX-72-5578-F. $4.50 in paper copy; $0.95 in microfiche. Report prepared for U.S. Section International Boundary and Water Commission, October 1972. 42 p, 1 fig.

Descriptors: *Texas, *Environmental effects, *Diversion structures, *Alteration of flow, Arroyos, Channels, Navigation, Water management (Applied), Obstruction to flow, Flow augmentation, Earthworks, Drainage engineering.
Identifiers: *Environmental Impact Statements, *Rio Grande Flood Control Project (Tex).

The proposed action is a modification of the existing Lower Rio Grande Flood Control System to divert flood flows to the Arroyo Colorado before

flows begin in the north floodway. This will be accomplished by construction of a low earth sill in the entrance to the North Floodway. The low flow diversion will restore drainage conditions to lands outside of and draining into the North Floodway. The sill will require less than one-acre and will not affect fishery in the lake. The increase in diversion to the Arroyo Colorado will not cause either significant sedimentation or velocities that would adversely affect navigation in the barge channel. The infrequent increased flow should not cause any major changes in the salinity of brackish waters of the Arroyo; it will have only a slight temporary effect on nursery and feeding areas for marine species. An alternative structural measure to accomplish the same result would require additional concrete openings through the divisor dike and a new channel requiring 34 acres of pasture and farmland. (Mockler-Florida)
W73-10264

DREDGING AND FILLING, COWIKEE STATE PARK, LAKEPOINT RESORT, WALTER F. GEORGE LAKE, CHATTAHOOCHEE RIVER, ALABAMA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.

Available from National Technical Information Service, U.S. Department of Commerce, EIS-AL-72-5555-F, $4.00 in paper copy; $0.95 in microfiche. June 1972. 33 p, 1 map.

Descriptors: *Alabama, *Project planning, *Environmental effects, *Artificial beaches, *Recreation facilities, Dredging, Recreation, Projects, Public benefits, Comprehensive planning, Land use, Multiple-purpose projects, Recreation demand, Water sports, Campsites, Fishing, Lakes, Land use, Marinas, Ecosystems, Social aspects, Swamps.
Identifiers: *Environmental impact statement, *Eufaula, Ala.

The site of the proposed project is in southeastern Alabama in Barbour County near the city of Eufaula on Walter F. George Lake on the Chattahoochee River. The project consists of the removal of 745,000 cubic yards of material by hydraulic dredge and placing the material in a low swampy area adjacent to the lake and within an area occupied by the summer pool. The filled area will be used for the construction of a marina, bathing beach, roads and parking facilities. Some land and water bottom will be covered by the dredged material. The ecological character of the terrestrial system will be permanently altered. A no-action alternative would result in continuing overuse of limited recreation area. Although the project requires the removal of some low relief area, the project will make available a much larger acreage for man's long-term recreational use. Implementation of the project would result in the permanent alteration of 42 acres of upland and 21 acres of water bottom. These resources would be committed to a park, recreation and nature area. The comments of various governmental and private agencies are included. (Reed-Florida)
W73-10265

CONTROL OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.) IN TVA RESERVOIRS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga.

Available from the National Technical Information Service as EIS-TN-72-3397-F, $6.50 paper copy, $0.95 in microfiche. Office of Health and Environmental Science, Report TVA-OHES-EIS-72-8, September 29, 1972. 82 p, 1 fig, 2 photo, 9 tab, 1 chart, 12 ref.

Descriptors: *Aquatic weed control, *Environmental effects, *Tennessee Valley Authority, *Water quality, Weeds, Weed control, Water level fluctuations, Reservoir operation, Water pollution sources, 2-4-D, Tennessee River, Federal project policy, Rivers, Waterfowl, Herbicides, Water pollution control, Recreation, Fishing, Plant growth, Aquatic plants.
Identifiers: *Eurasian watermilfoil, *Environmental Impact Statements.

This action consists of water level management and application of 2,4-D herbicide in order to achieve and maintain control of watermilfoil to the degree necessary to protect public health and to assure that economic and recreational values of the Tennessee Valley Authority reservoir system are not materially impaired. Beneficial impacts of the project include socioeconomic benefits resulting from returning reservoirs and contiguous lands to maximum potential for recreational and other land uses, increased production of sport fish as a result of water level drawdown and the removal of shelter for forage fish. Potential adverse effects include low concentration of herbicides in water supplies, minor damage to nontarget aquatic and terrestrial plants, minor loss of food and shelter for some fish species and waterfowl and decreased fish spawning. Alternatives to this program included mechanical control, biological control, water level management, use of 2,4-D alone and use of other herbicides. (Reed-Florida)
W73-10266

BRANTLEY PROJECT.
For primary bibliographic entry see Field 06E.
W73-10270

PUBLIC ACCESS TO RESERVOIRS TO MEET GROWING RECREATION DEMANDS.
For primary bibliographic entry see Field 06E.
W73-10273

SAN ANGELO PROJECT, TEXAS.
For primary bibliographic entry see Field 06E.
W73-10275

DRAINAGE DISTRICTS, COMMISSION COMPOSITION AND POWERS.
For primary bibliographic entry see Field 06E.
W73-10301

REGIONAL WATER DISTRIBUTION DISTRICTS.
For primary bibliographic entry see Field 06E.
W73-10302

ARKANSAS RIVER BASIN COMPACT.
For primary bibliographic entry see Field 06E.
W73-10305

TIME PERIODS AND PARAMETERS IN MATHEMATICAL PROGRAMMING FOR RIVER BASINS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
J. A. Poblete, and R. T. McLaughlin.
Report No 128, September 1970. 325 p, 7 fig, 34 tab, 57 ref, 7 append.

Descriptors: *Linear programming, *Mathematical models, *River basin development, *Synthetic hydrology, *Reservoir operation, Model studies.
Identifiers: Time periods, Integer programming, Deterministic hydrology.

The preliminary analysis of a river-basin development is repeated with several different mathematical models of increasing complexity and with several different values for important parameters included in the models. The results of these various models are compared for their effects upon practical insights and decision-making. Five models employed linear programming with deterministic hydrology in which various time periods were used to describe the hydrology and reservoir operation. In addition, an integer program was used to allow discrete values of reservoir size and to permit reservoir costs to reflect advantages of scale. This model was cyclical with 4 periods of 3 months. The parameters varied within these models were both economic and physical. Simple mathematical programming models were found to be both valuable and fairly sensitive tools. Various methods were discussed for imporving the outcomes of these models. Mixed integer programming was found to introduce significantly more 'engineering reality' into the approach. (Weaver-Wisconsin)
W73-10317

BENEFIT-COST ANALYSIS FOR WATER RESOURCE PROJECTS,
Tennessee Valley Authority, Muscle Shoals, Ala.
For primary bibliographic entry see Field 06B.
W73-10318

NAVIGATION CHANNEL IMPROVEMENT--GASTINEAU CHANNEL, ALASKA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08B.
W73-10320

EXPECTED NUMBER AND MAGNITUDES OF STREAM NETWORKS IN RANDOM DRAINAGE PATTERNS,
California Univ., Irvine.
C. Werner.
Proceedings of the Association of American Geographers, Vol 3, p 181-185, 1971. 1 fig, 2 tab, 7 ref. NSF GS-2989.

Descriptors: *River basins, *Drainage area, Drainage patterns (Geologic), *Topography, *Networks, Mathematical models, Equations, Hydrologic data, Correlation analysis, Kentucky, Geology, Geomorphology, Streams.
Identifiers: *Stream networks, Random drainage patterns, Stream merger distribution.

How does a set of first order streams behave, i.e., what kind of resulting drainage pattern can be expected if all topologically different patterns of stream mergers (including no merger) are equally likely. For this assumption deductions are made for mathematical expressions of the number of topologically different patterns possible, the frequencies of networks by magnitude, the expected number of networks to develop, and their distribution with regard to magnitude. The expected number of networks emerging from any sequence of first order streams is always smaller than 3, and one of them is always identical with one of the original first order streams. The theoretical findings are tested by using samples of drainage network data from an area in eastern Kentucky that is essentially free of geologic controls. Chisquare tests show that empirical data follow closely to the predicted figures. (Woodard-USGS)
W73-10335

PATTERN AND PROCESS IN DUNE SLACK VEGETATION ALONG AN EXCAVATED LAKE IN THE KENNEMER DUNES, (IN DUTCH),
For primary bibliographic entry see Field 02H.
W73-10392

AN ANALYSIS OF ECOLOGICAL FACTORS LIMITING THE DISTRIBUTION OF A GROUP OF STIPA PULCHRA ASSOCIATIONS,
Kon-Kuk Univ., Seoul (South Korea). Dept. of Biology.

R. H. Robinson.
Korean J Bot. Vol 14, No 3, p 1-20. 1971. Illus.
Identifiers: Avena-fatua, *California (Monterey), *Distribution patterns (Plants), Ecological studies, Foothill, Forbs, Grasslands, Moisture, Phosphorus, Soils, *Stipa-pulchra, Valley, Woodlands.

Ecological factors limiting S. pulchra have been determined in experimental gardens and at several sites in the hills south and east of Monterey, California. The S. pulchra facies of Valley Grassland communities were found to be dominated by that species, though a total of 36 grasses and forbs were collected and identified. Basal area was not large, but aerial cover by Stipa alone averaged over 50%. Across an ecotone between a Stipa association and the California Annual Type a sudden and dramatic change was recorded. Soil measurements there, and in other nearby areas, showed a much higher clay content with more available water and elemental P at the Stipa sites. Germination of Stipa seeds was high under all laboratory and field conditions, though growth of seedlings was highly variable. Seedlings grown in Stipa soil with an abundance of water were vigorous and reached anthesis the first year. In other soils they grew less, and when grown in competition with Avena fatua they scarcely grew at all. These findings indicate that when established on desirable soils, Stipa competes well and apparently precludes the dominance of A. fatua and other large annual grasses. On the other hand, because of a lack of vigor in its seedlings, Stipa cannot reinvade the rich more friable soils on which it was once found, andon which it was shown to grow satisfactorily. This supports the contention that S. pulchra was the dominant grass through much of the Walley Greenland and Foothill Woodland, but also indicates that well-drained soils and those poor in mineral nutrients probably never supported such associations.--Copy 1973, Biological Abstracts, Inc.
W73-10400

4B. Groundwater Management

GROUNDWATER CONSITIONS IN THE CENTRAL VIRGIN RIVER BASIN, UTAH,
Geological Survey, Salt Lake City, Utah.
R. M. Cordova, G. W. Sandberg, and W. McConkie.
Utah Department of Natural Resources, Salt Lake City, Technical Publication No 40, 1972. 64 p, 10 fig, 3 plate, 18 tab, 12 ref, 1 append.

Descriptors: *Groundwater resources, *Well data, *Aquifer characteristics, *Water quality, *Utah, Hydrogeology, Water wells, Water levels, Withdrawal, Pumping, Water yield, Water utilization, Groundwater recharge, Chemical analysis, Hydrologic data, Basic data collections.
Identifiers: *Virgin River basin (Utah).

The central Virgin River basin, in Washington and Iron Counties, Utah, includes about 1,000 square miles in the drainage basin of the Virgin River downstream from Hurricane Cliffs. Aquifers in both consolidated and unconsolidated rocks supply water for public supply, irrigation, stock, industry, and domestic uses. The chief unconsolidated-rock aquifers are alluvial fans and channel-fill deposits, which supply about 80% of the water withdrawn by wells in the basin. The chief consolidated-rock aquifers include the Moenkopi, Chinle, Moenave, and Kayenta Formations, the Navajo Sandstone, basalt, and Tertiary igneous rocks of the Pine Valley Mountains. Average annual recharge to the aquifers of the central Virgin River basin is estimated to be 100,000 acre-feet. Discharge from wells averaged 6,600 acre-feet annually for the years 1968-70. Water-level hydrographs give no indication that withdrawals of groundwater to date have had any significant effect on the amount of groundwater in storage. The dissolved-solids concentration in the water differs considerably from aquifer to aquifer and from place to place. The aquifers that are most likely to yield water containing less than 1,000 milligrams per liter are the Navajo Sandstone and basalt. The Chinle and Moenkopi Formations are most likely to yield water containing more than 3,000 milligrams per liter. (Woodard-USGS)
W73-09791

GROUNDWATER RESOURCES OF MOTLEY AND NORTHEASTERN FLOYD COUNTIES, TEXAS.
Geological Survey, Austin, Tex.
J. T. Smith.
Texas Water Development Board, Austin, Report 165, March 1973. 66 p, 8 fig, 10 tab, 45 ref.

Descriptors: *Groundwater resources, *Water wells, *Water quality, *Aquifer characteristics, *Texas, Well data, Withdrawal, Pumping, Water yield, Drawdown, Groundwater recharge, Hydrogeology, Hydrologic data, Basic data collections, Water levels, Chemical analysis, Water utilization.
Identifiers: *Motley County (Tex), Floyd County (Tex).

The principal sources of groundwater in Motley County and northeastern Floyd County, Texas, are the alluvial deposits of Quaternary age, the Ogallala Formation of Tertiary age, and the upper part of the Dockum Group (Trujillo Formation) of Triassic age. Rocks of Permian age supply small amounts of slightly saline to very saline water. The alluvial deposits and the upper part of the Dockum Group are the most prolific aquifers. The average yield of irrigation wells tapping these units is about 400 gpm. The Permian rocks usually yield less than 100 gpm to wells that range in depth from about 50 to over 300 feet. The alluvial deposits cover about 25% of the area but supply a large part of the water needs. The Permian rocks are used almost entirely as a source of water for domestic and stock supplies. In 1968, about 11,200 acre-feet of groundwater was pumped for municipal supply, industrial use, and irrigation; of the 11,200 acre-feet pumped, about 9,400 acre-feet was used to irrigate 6,823 acres. Generally, the water from the Ogallala Formation and the Dockum Group is the least mineralized. The water from the Permian rocks is more highly mineralized and in some parts of the area it is unfit for domestic use. The quality of the water in the alluvium depends upon the source of recharge. (Woodard-USGS)
W73-09792

GROUNDWATER RESOURCES OF HALL AND EASTERN BRISCO COUNTIES, TEXAS.
Geological Survey, Austin, Tex.
B. P. Popkin.
Texas Water Development Board, Austin, Report 167, April 1973. 84 p, 8 fig, 7 tab, 16 ref.

Descriptors: *Groundwater resources, *Water wells, *Water quality, *Aquifer characteristics, *Texas, Well data, Withdrawal, Pumping, Water yield, Drawdown, Groundwater recharge, Hydrogeology, Hydrologic data, Basic data collections, Water levels, Chemical analysis, Water utilization, Irrigation, Water supply.
Identifiers: *Hall County (Tex), *Eastern Brisco County (Tex).

Hall and eastern Brisco Counties are in the southeastern part of Texas Panhandle. Nearly all the water used in the area is from wells and springs. Most of the water for irrigation and all water for public supply in Hall County is from alluvial deposits. In eastern Brisco County, most of the water for irrigation and public supply is pumped from aquifers in the Ochoa Series of Permian age. The total groundwater withdrawal in 1968 was approximately 28,700 acre-feet. About 65% of this amount was from the alluvial deposits and nearly 20% from the Ochoa Series. Water levels in most of the irrigation areas declined during the period 1960-69 from less than 1.0 to 29.0 feet. Water from the Permian units generally is of the calcium sulfate type and has a dissolved-solids content that ranges from less than 1,000 to more than 10,000 milligrams per liter. The quality of water from the Quaternary alluvium and terrace deposits varies widely, depending upon the source of recharge. Where the alluvium is recharged from Permian rocks, the water usually contains calcium and sulfate as the major constituents. Where the recharge is mostly from direct infiltration of rainfall, the water contains calcium and bicarbonate as the major constituents. (Woodard-USGS)
W73-09793

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF THE LOWER AROOSTOOK RIVER BASIN, MAINE,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07C.
W73-09801

INVESTIGATIONS AND FORECAST COMPUTATIONS FOR THE CONSERVATION OF GROUNDWATER (ISSLEDOVANIYA I PROGNOZNYYE RASHETY DLYA OKHRANY PODZENMYKH VOD),
For primary bibliographic entry see Field 05B.
W73-09802

WATER RESOURCES DEVELOPMENT IN THE MULLICA RIVER BASIN PART II: CONJUNCTIVE USE OF SURFACE AND GROUNDWATERS OF THE MULLICA RIVER BASIN,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
M. L. Granstrom, G. H. Nieswand, and R. Ahmed.
Available from the National Technical Information Service as PB-220 739, $3.00 in paper copy, $0.95 microfiche. Partial Completion Report, March 1973. 59 p, 8 fig, 20 tab, 32 ref. OWRR B-014-NJ (5) and B-018-NJ (3). 14-01-0001-1529, 14-31-0001-3105.

Descriptors: *Surface-groundwater relationships, Hydrology, *Optimization, Water supply, Water yield, Groundwater, Subsurface waters, *Conjunctive use, *New Jersey, *Balance of nature, *Water transfer, Linear programming, Model studies.
Identifiers: *Mullica River basin (N.J.).

The potential transfer of water from the Mullica River Basin prompted a joint study by biologists and engineers to determine (1) the minimum average monthly streamflow necessary to maintain an appropriate ecological balance in the riverbay system and (2) the optimum combination of groundwater-surface water pumping to maximize yields and to meet the ecological criteria. This report describes the geological and hydrological characteristics of the Mullica River Basin and explores engineering means of withdrawing water supply under somewhat unusual circumstances. The report is based upon the procedural methods developed in two Ph.D. theses in Engineering at Rutgers University. A change constrained linear programming model for the conjunctive use of ground- and surface water was used, along with groundwater aquifer-stream system equations to obtain rates of optimum withdrawal of surface waters and groundwater consistent with specified objective functions and sets of physical and operational constraints. The physical constraints are those given in terms of minimum streamflow residuals. Optimization was obtained using linear programming techniques. (See also W72-12706) (Whipple-Rutgers)
W73-09870

WELL PUMPING APPARATUS FOR POLLUTED WATER,
Mowid Anstalt, Vaduz (Liechtenstein). (Assignee).
For primary bibliographic entry see Field 05G.
W73-09935

DRAWDOWN AND RECOVERY OF AN ARTESIAN SAND AND GRAVEL AQUIFER, LONDON, ONTARIO, CANADA,
Ontario Water Resources Commission, Toronto. Div. of Water Resources.
For primary bibliographic entry see Field 02F.
W73-09948

GROUNDWATER RESEARCH IN THE OPEN--CAST MINING AREA OF THE SOUTHERN NIEDERRHEIN-BUCHT (WEST GERMANY),
Geologisches Landesamt Nordrhein-Westfalen, Krefeld (West Germany).
For primary bibliographic entry see Field 02F.
W73-09951

ASSESSMENT OF GROUNDWATER RECHARGE IN THE UPPER TARNAK BASIN OF AFGHANISTAN,
United Nations Development Program, New York.
For primary bibliographic entry see Field 02F.
W73-09957

GROUNDWATER IN PERSPECTIVE,
Geological Survey, Washington, D.C.
R. L. Nace.
Water Resources Bulletin, Vol 9, No 1, p 18-24, February 1973. 1 fig, 1 tab, 8 ref.

Descriptors: *Aquifers, *Groundwater resources, Water storage, Water management (Applied), Hydrogeology, Aquifer characteristics, Conjunctive use, Water resources development.

Because of their enormous capacity, groundwater reservoirs are at least equal in importance to the groundwater itself. As regulators of water movement in the hydrological cycle, these reservoirs surpass all lakes and reservoirs combined. While many aquifers are not well understood, data on many others are adequate for long-range broad-scale planning. An example is the basalt aquifer of the Snake River Plain in Idaho. However, the area has managerial problems which concern the time, the place, and the feasibility of manipulations of water. All continents of the world contain great aquifers. For every huge aquifer, however, hundreds of smaller ones occur, and even these contain large amounts of water. Aquifers in the Ohio River basin of the United States are good examples. Management of total water resources is a difficult problem at many places. But many problems could be met and many water shortages alleviated or eliminated by use of aquifers, not merely as sources of water but as reservoirs for management of water. (Knapp-USGS)
W73-09994

SUBSIDENCE AND ITS CONTROL,
Geological Survey, Sacramento, Calif.
J. F. Polland.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 50-71, 1972. 20 fig, 2 tab, 50 ref.

Descriptors: *Land subsidence, *Withdrawal, *Compaction, *Overdraft, Subsidence, Groundwater, Hydrogeology, Oil fields, Injection wells, Aquifer characteristics, Pore pressure, Drawdown.

Land subsidence caused by fluid withdrawal most commonly affects overdrawn groundwater basins, but subsidence of serious proportions also has occurred in several oil and gas fields. The San Joaquin Valley in California is the area of the most intensive land subsidence in the United States. Surface-water imports to subsiding areas have reduced groundwater extractions and raised the artesian head, causing subsidence rates to decrease. Wilmington oil field, in the harbor area of Los Angeles and Long Beach, California, is not only the oil field of maximum subsidence (29 ft) in the United States but also the outstanding example of the subsidence control by injection and repressuring. Large-scale repressuring was begun in 1958 by use of injection water obtained from shallow wells. Subsidence at some bench marks was stopped by 1960. In evaluation of potential land subsidence due to the fluid withdrawal, an essential parameter is the compressibility of aquifers. When effective (grain-to-grain) stress exceeds maximum prior stress, the compaction is primarily inelastic and nonrecoverable. If fluid pressures in an elastic, compacting, confined system are increased sufficiently, subsidence will stop. If fluid pressures continue to increase, the system will expand elastically. (Knapp-USGS)
W73-10024

NATURAL AND INDUCED FRACTURE ORIENTATION,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W73-10030

MECHANICS OF HYDRAULIC FRACTURING,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02F.
W73-10031

EARTHQUAKES AND FLUID INJECTION,
National Center for Earthquake Research, Menlo Park, Calif.
For primary bibliographic entry see Field 02F.
W73-10033

TECHNICAL AND ECONOMIC FACTORS OF VARIOUS TECHNIQUES OF RANGELAND IRRIGATION, (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W73-10090

CLOSED BASIN DIVISION, SAN LUIS VALLEY PROJECT, COLORADO.
For primary bibliographic entry see Field 06E.
W73-10268

CONSERVATION--LICENSING POWERS.
For primary bibliographic entry see Field 06E.
W73-10279

ALABAMA WATER WELL STANDARDS.
For primary bibliographic entry see Field 06E.
W73-10291

WATER WELL CONSTRUCTION ACT.
For primary bibliographic entry see Field 06E.
W73-10304

PUBLIC WATER SUPPLIES OF SELECTED MUNICIPALITIES IN FLORIDA, 1970,
Geological Survey, Tallahassee, Fla.
H. G. Healy.
Florida Department of Natural Resources, Bureau of Geology, Information Circular No 81, 1972. 213 p, 28 fig, 4 tab, 79 ref.

Descriptors: *Potable water, Water resources, *Water supply, *Groundwater, *Surface waters, *Florida, Cities, Water utilization, Water wells, Well data, Aquifers, Streams, Lakes, Chemical analysis, Water users, Human population, Urbanization, Municipal water, Water quality, Water analysis, Basic data collections, Hydrologic data, Desalination.
Identifiers: *Florida cities.

Of the 138 Florida municipalities in this report, 119 use groundwater and 19 use surface water either wholly or partly. The groundwater supply constitutes 87%, 635 million gallons per day (mgd), of the total demand of the 138 municipalities, and surface water supplies 13%, or 91 mgd. The principal sources of groundwater used by the 138 cities and the amounts are: the Biscayne aquifer, 305 mgd; the Floridan aquifer, 277 mgd; the sand-and-gravel aquifer, 21 mgd; and the shallow sand aquifer, 20% mgd. Other minor aquifers yielded 10 mgd. Most of the surface-water supply, 55 mgd, was diverted from rivers. Lakes supplied 31 mgd and reservoir 4 mgd. An infiltration gallery and desalinization plant together supplied 3 mgd. Of the rivers, Hillsborough River supplied the most, 45 mgd to Tampa; the Myakka-Hatchee River supplied the least, 0.25 mgd to North Port Charlotte. Per capita use of water in the 138 municipalities ranged from 40 to 390 gallons per day and averaged 167. Of the 162 chemical analyses listed in the report, 148 represent water quality during 1967-72 and 14 before 1967. The analyses represent both raw and treated water, virtually all from groundwater sources. Groundwater supplies are typically hard to very hard except in extreme northwestern Florida where water from the sand-and-gravel aquifer is very soft. (Woodard-USGS)
W73-10319

WATER RESOURCES OF THE RED RIVER OF THE NORTH DRAINAGE BASIN IN MINNESOTA,
Geological Survey, St. Paul, Minn.
For primary bibliographic entry see Field 02E.
W73-10321

TEST-OBSERVATION WELL NEAR PATERSON, WASHINGTON: DESCRIPTION AND PRELIMINARY RESULTS,
Geological Survey, Tacoma, Wash.
H. E. Pearson.
Geological Survey Water-Resources Investigations 9-73, 1973. 23 p, 5 fig, 4 tab, 3 ref.

Descriptors: *Test wells, *Well data, *Washington, Aquifer characteristics, Pumping, Water yield, Water quality, Hydrogeology, Specific capacity, Drawdown, Observation wells, Irrigation wells, Chemical analysis.
Identifiers: *Paterson (Wash).

Initial irrigation development in the Horse Heaven Hills area started near the towns of Paterson and Plymouth, Washington, along the Columbia River and has relied on surface water from the river. The first stages of irrigation of land farther from the river created a need for more complete data on groundwater conditions than that provided from the few existing irrigation wells in the area. A 860-foot test-observation well, 10 to 6 inches in diameter, was drilled in the Horse Heaven Hills about 8 miles north of Paterson in the valley of the East Branch of Glade Creek. The well, drilled by the air-rotary method, penetrates productive aquifer zones at the 735- and 860-foot depths. Test pumping showed that the well had specific capacities of 58 gpm per foot of drawdown at the 735-foot depth and 148 gpm per foot of drawdown at the 860-foot and final depth. The tests indicate that large amounts of water occur only at these, and possibly greater, depths. The water is soft and is suitable for all common uses. (Woodard-USGS)
W73-10322

ALPHA-RECOIL THORIUM-234: DISSOLUTION INTO WATER AND THE URANIUM-234/URANIUM-238 DISEQUILIBRIUM IN NATURE,
Gakushuin Univ., Tokyo (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 05B.
W73-10325

GROUND WATER IN COASTAL GEORGIA,
Geological Survey, Atlanta, Ga.
R. E. Krause.
The Georgia Operator, p 12-13, Winter 1973. 2 fig.

Descriptors: *Groundwater resources, *Aquifer characteristics, Hydrogeology, *Georgia, *Water wells, Coasts, Pumping, Withdrawal, Water yield, Water utilization, Industrial water, Drawdown, Water level fluctuations, Grundwater recharge, Groundwater movement, Water quality, Saline water intrusion, Reviews, Water supply, Water demand.

The coastal area of Georgia draws most of its water from the 'principal artesian aquifer,' which is a limestone deposited more than 25 million years ago. The aquifer, or water-bearing formation, is more than 500 feet thick and lies from 150 to 600 feet below land surface. Groundwater withdrawal has increased markedly since the first wells were laborously drilled into the limestone in the late 1800's. Single industrial wells with diameters of over 20 inches now pump millions of gallons of water daily, around the clock, throughout the year. Pumpage from the aquifer in coastal Georgia now totals well over a quarter of a billion gallons per day. Pumping is centered mainly in Brunswick, Savannah, and Jesup, and over 80 percent of that used is for industry. The water level in this aquifer is declining as a result of groundwater withdrawal. The decline in water level and resultant decrease in area where flowing wells exist is noted on two maps. The groundwater is of good quality and is generally not treated except for aeration and chlorination when used for municipal supply. (Woodard-USGS)
W73-10326

NON-EQUILIBRIUM PHENOMENA IN CHEMICAL TRANSPORT BY GROUND-WATER FLOW SYSTEMS,
Nevada Univ., Reno. Desert Research Inst.
For primary bibliographic entry see Field 05B.
W73-10329

EFFICIENCY OF PARTIALLY PENETRATING WELLS,
Maryland Univ., College Park. Dept. of Civil Engineering.
Y. M. Sternberg.
Ground Water, Vol 11, No 3, p 5-8, May-June 1973. 3 fig, 2 tab, 5 ref.

Descriptors: *Drawdown, *Water yield, *Water wells, Transmissivity, Aquifer characteristics, Storage coefficient, Discharge (Water).
Identifiers: *Well efficiency, *Partially penetrating wells.

A graphical solution is presented for the determination of total drawdown of partially penetrating wells. This simplified solution agrees with the more complicated exact solution and can be used to evaluate the efficiency of such wells. (Knapp-USGS)
W73-10336

CONTRIBUTION TO THE STUDY OF THE ALGAL FLORA OF ALGERIA,
Algiers Univ. (Algeria). Faculty of Science.
For primary bibliographic entry see Field 02I.
W73-10399

4C. Effects on Water of Man's Non-Water Activities

STREAM CHANNEL ENLARGEMENT DUE TO URBANIZATION,
Regional Science Research Inst., Philadelphia, Pa.
T. R. Hammer.
Water Resources Research, Vol 8, No 6, p 1530-1540, December 1972. 3 tab, 7 ref.

Descriptors: *Urbanization, *Channel erosion, Channel morphology, Land use, Watersheds, *Regression analysis, Sewers, *Pennsylvania, Erosion, Urban hydrology, Storm runoff, Storm drains, Rainfall-runoff relationships, Topography, Slopes, Storm water.
Identifiers: *Impervious land cover, *Philadelphia, Stream channel enlargement.

Results are summarized of an empirical study of the effect of urbanization on stream flows and stream channel enlargements. Land use data and stream channel cross-sectional areas were obtained for 78 small watersheds near Philadelphia. Regression analyses were used to relate the variables. Some of the findings are: land areas containing sewered streets and major impervious areas such as parking lots had the greatest channel enlargement effects, residential areas without sewered streets have little effect, and urban areas over 30 years old have little effect. The influence of urbanization on channel enlargement is significantly related to the topography of the watershed, the location of the urban area within the watershed, and man imposed drainage alterations. In particular, a critical factor is basin slope. Channel enlargement was considered to be an important phenomenon to study because of its effects on the aesthetic and recreational value of the stream. (Elfers - North Carolina)
W73-09878

CRITERIA OF DETERMINATION OF INDUSTRIAL LANDS, (IN POLISH),
L. Langhamer.
Pamiet Pulawski. 48, p 31-39, 1971. Illus. English summary.
Identifiers: Chemistry, Criteria, Deformation (Land), Dust, Flooding, *Industrial land use, Mechanical industry, Mining, *Soils.

Industrial lands arise in consequence of industrial activity, especially of mining, building and infrastructural factors upon the soils. The change of the natural properties and in consequence deformation and devastation of soils is the result of these activities. Factors forming industrial lands are: mechanical deformations, covering with dust, overdrying and flooding. The direct influence of mining depends on the deformation of the surface causing changes in the water relationships of soils. Mechanical deformation or devastation of soils results from the direct influence of industry and building. The indirect effect of industry, mining, building and infrastructure is reduced to hydrological changes in soils and chemical changes in soils. Industrial lands occur on the territories of different areas, around industrial centers, agglomeration of towns, in the valleys of industrial sewage and along the tracks of communication. In most cases industry, especially mining and building ground development is unfavorable for agriculture changes in soils and reduces the agricultural productive area.--Copyright 1972, Biological Abstracts, Inc.
W73-09947

4D. Watershed Protection

ROCK MULCH IS REDISCOVERED,
Arizona Univ., Tucson. Dept. of Soils, Water and Engineering.
For primary bibliographic entry see Field 03B.
W73-10212

SIMON RUN WATERSHED PROJECT, POTTAWATTAMIE COUNTY, IOWA (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Des Moines, Iowa.

Available from National Technical Information Service, Department of Commerce, EIS-USDA-SCS-ES-WS (ADM)-73-12 (F). $3.00 in paper copy, $0.95 in microfiche. September 1972. 17 p, 1 plate, 1 tab.

Descriptors: *Iowa, *Watershed management, *Environmental effects, *Erosion control, *Flood control, Corn Belt, Land management, River basin development, Soil management, Water conservation, Water management (Applied), Water storage, Dams, Spillways, Ponds, Gully erosion, Watersheds (Basins), Water utilization, Voids.
Identifiers: *Environmental Impact Statements, *Simon Run Watershed, Iowa.

The project proposes conservation land treatment and a series of eight grade stabilization structures for flood prevention and gully erosion control. The project will eliminate gully erosion on 904 acres, reduce flood damage 52% and inundate 55 acres of various land types to create permanent pools. Two and one-half miles of intermittent stream channels will be inundated by the pools. Twenty-five acres of cropland, gully and pasture are expected to change to grasses and aquatic vegetation. A system of structural measures only was rejected because it does not provide upstream treatment. A land treatment program only was also considered but rejected because it would not stop land voiding and depreciation or flood control. Use of the watershed for agricultural production is not expected to change and the project should improve productivity. Approximately 70 acres of land will be used for dams, spillways, and permanent pools. (Dunham-Florida)
W73-10263

NAVIGATION CHANNEL IMPROVEMENT--GASTINEAU CHANNEL, ALASKA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
For primary bibliographic entry see Field 08B.
W73-10320

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

STUDIES ON BENTHIC NEMATODE ECOLOGY IN A SMALL FRESHWATER POND,
Auburn Univ., Ala. Dept. of Botany and Microbiology.
T. W. Merritt, Jr.
Available from the National Technical Information Service as PB-220 679, $3.00 in paper copy, $0.95 in microfiche. Alabama Water Resources Research Institute Auburn Bulletin 8, February 1973. 73 p, 28 fig, 19 tab, 27 ref. (partial completion report). OWRR A-004-ALA (1).

Descriptors: *Nematodes, *Bacteria, *Fungi, Population, Distribution patterns, Habitats, Dominant organisms, Ponds, *Alabama, *Benthic fauna, Dissolved oxygen, Water temperature, Hydrogen ion concentration, *Bottom sediments.

Benthic nematode population fluctuations and biological, chemical and physical factors of the nematode environment were studied over a nine months period at ten selected stations in a small farm pond situation. Nematode community structure was investigated over a three months period.

Changes in temperature and pH of the bottom muds and in dissolved oxygen of the overlying water were not found to correlate with nematode concentration changes. Peaks in nematode numbers were observed in December 1966 and in April 1967. A definite correlation in numbers of nematodes, numbers of bacteria, and numbers of fungi with the thickness of the detritus layer overlying the mud surface was observed. Selective deposit feeding nematodes was the predominant feeding type found at the ten stations during the three months period.
W73-09751

PHYSICAL AND CHEMICAL PROPERTIES OF THE COASTAL WATERS OF GEORGIA,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 02L.
W73-09752

A CRITICAL TEST OF METHODS FOR ISOLATION OF VIRUSES FOR USE IN CONTROL OF NUISANCE ALGAE,
Illinois Univ., Chicago. Dept. of Biological Sciences.
H. N. Guttman.
Available from the National Technical Information Service as PB-220 681, $3.00 in paper copy $0.95 in microfiche. Illinois, Water Resources Center, Urbana, Research Report No 63, April 1973. 17 p, 4 fig, 4 ref. OWRR A-043-ILL (1). 14-31-0001-3513.

Descriptors: *Algae, *Viruses, *Cyanophyta, *Plant viruses, *Isolation, Algal control, Biocontrol, Pollutant identification, Illinois, *Nuisance algae.
Identifiers: Temperate viruses, *Plectonema boryanum, Chicago, Virus removal, Lysogenesis.

The objects of this study were (a) to compare the two major methods for isolation of blue-green algae viruses in order to determine whether the finding of viruses in any one local depended upon the isolation method used; (b) to isolate an array of virulent blue-green algae viruses which could be used for field control of these algal polluters. It was found that the large sample plus concentration method of Padan et al, is useful for detecting a high incidence of temperate viruses to blue-green algae (at the initiation time of our study temperate viruses to blue-green algae were unknown). Two temperate viruses to Plectonema boryanum was studies in detail. It was found that algae infected with temperate viruses, like our type T-5, grow well in the Spring and Fall (moderate water temperature) but not in the summer when ambient water temperature rises. Since infection of algae with temperature viruses immunizes the algae to infection with closely related virulent viruses, we concluded that use of virulent viruses to remove blue-green algae from waterways in the greater Chicago metropolitan area is not practical. Virus removal of blue-green algae is only practical in (a) areas in which the natural incidence of temperature viruses is low or (b) cases in which noncross reacting virulent viruses are available. Virus removal of algae remains an attractive concept because of its specificity but, at the present, may require too much economic investment to locate appropriate viruses.
W73-09753

AUTOMATION OF THE BACTERIOLOGICAL ANALYSIS OF WATER, I, STUDY OF A NEW SPECIFIC TEST FOR FECAL CONTAMINATION AND THE OPTIMAL CONDITIONS FOR ITS DETERMINATION,
Institut Pasteur, Lille (France). Laboratoire d'-Hydrobiologie.
P. A. Trinel, and H. Leclerc.
Water Research, Vol 6, No 12, p 1445-1458, December 1972. 13 fig, 1 tab, 14 ref.

Descriptors: *Synthesis, *Measurement, *Automation, Methodology, Bacteria, E. coli, Enzymes, *Water analysis, Amino acids, Separation techniques, Analytical techniques.
Identifiers: *Glutamic acid decarboxylase, Autoanalyzer.

With the aid of the Technicon auto-analyzer, the optimal conditions for synthesizing and measuring glutamic acid decarboxylase in suspensions of Escherichia coli have been defined. The proposed system allows for a simple, rapid and precise search for the glutamic acid decarboxylase in bacterial suspensions. It can also be used for the bacteriological analysis of water. (Holoman-Battelle)
W73-09772

POLLUTION RELATED STRUCTURAL AND FUNCTIONAL CHANGES IN AQUATIC COMMUNITIES WITH EMPHASIS ON FRESHWATER ALGAE AND PROTOZOA,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-09875

DETERMINATION OF THE TOTAL AMOUNT OF CARBOHYDRATES IN OCEAN SEDIMENTS,
V. Ye. Artem'yev, L. N. Krayushkin, and Ye. A. Romankevich.
Oceanology, Vol 11, No 6, p 934-936, August 1972. 3 tab, 8 ref.

Descriptors: *Carbohydrates, *Sediments, *Sea water, *Inorganic compounds, *Organic compounds, Ions, Proteins, Amino acids, Phenols, Pollutant identification.
Identifiers: *Phenol method.

The applicability of the phenol method for the determination of carbohydrates in oceanic sediments was studied. Using the phenol method, various organic and inorganic compounds and combinations at concentrations greatly exceeding their content in bottom sediments were found to have no effect on the determination of carbohydrates. The maximum permissible concentrations of some inorganic compounds were determined in sediments. (Ensign-PAI)
W73-09884

MERCURY IN SEA-FOOD FROM THE COAST OFF BOMBAY,
Tata Inst. of Fundamental Research, Bombay (India).
For primary bibliographic entry see Field 05C.
W73-09891

DETERMINATION OF TRACES OF IRON, COBALT AND TITANIUM IN SEA WATER AND SUSPENDED MATTER (IN SAMPLES FROM THE BALTIC SEA AND ATLANTIC OCEAN),
Ye. M. Yemel'yanov, I. K. Blazhis, R. Yu. Yuryavichyus, R. I. Payeda, and Ch. A. Valyukyavichyus.
Oceanology, Vol 11, No 6, p 924-933, August 1972. 1 fig, 11 tab, 16 ref.

Descriptors: *Iron, *Cobalt, *Titanium, Sea water, Suspended solids, Membrane filtration, Colorimetry, *Atlantic Ocean, Pollutant identification.
Identifiers: *Baltic Sea, *North Sea, Wet combustion, Extraction-kinetic method, Sensitivity.

Iron, cobalt and titanium were determined in 250 small samples of marine suspended matter (1 to 3 mg), collected by membrane filtration on filters with pores 0.5 to 0.7Micro in diameter. The samples were dissolved by 'wet combustion' and iron was then determined colorimetrically with violet pyrocatechol, titanium colorimetrically with tiron and cobalt by the extraction-kinetic method. The sensitivity of the methods used was 2 Microgram/liter for iron, 2.0.01 Microgram/liter for cobalt and 10 Microgram/liter for titanium. In the Baltic Sea, North Sea and Northeast Atlantic 5.7 to 2595.4 Microgram/liter of Fe, 2.6.0.0001 to 3.07.0.01 Microgram/liter of Co were determined. The amounts of 0.29 to 24.81 and 1.10-5 to 1.38.10-3%, make up the per cents of dry weight respectively. In the Baltic Sea, 0.00 to 17.88 Microgram/liter or 0.00 to 0.53% of Ti was determined. (Ensign-PAI)
W73-09895

SEDIMENTARY PHOSPHORUS IN THE PAMLICO ESTUARY OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 05B.
W73-09897

INDIGENOUS AND PETROLEUM-DERIVED HYDROCARBONS IN A POLLUTED SEDIMENT,
Woods Hole Oceanographic Institution, Mass.
M. Blumer, and J. Sass.
Marine Pollution Bulletin, Vol 3, No 6, p 92-94, June, 1972. 1 fig, 1 tab, 16 ref. ONR CO-241, NSF GA-19472.

Descriptors: *Bays, *Oil wastes, Chemical analysis, Marine animals, Marine plants, *Sediments, Pollutant identification, Sampling, Laboratory tests, *Massachusetts.
Identifiers: *Buzzard's Bay (Mass), *Paraffins.

Chemical analysis was used to determine the presence of petroleum and petroleum products in Buzzard's Bay (Mass.) organisms and sediments. Core samples made of sediments at various locations in the bay show evidence of bacterial depletion of fuel oils in the upper 2.5 cm of the smaple. Sediments in lower sections (7.5 cm and below) of the core exhibit a strong predominance of odd carbon number paamffins. Spilled oil exhibits no odd carbon predominance, so these core analyses suggest that fuel oils have not penetrated the sediment beyond the 7.5 cm level. The area between 2.5 cm and 7.5 cm is an intermediate one, showing some signs of polluted oil as well as some natural hydrocarbon content. Spilled oil in the uppermost section of the core samples has been partially dissolved and degraded by bacteria; still, after 2 years, the fuel oil hydrocarbon in this top segment exceeds the indigenous hydrocarbons in the lower section by 1-1/2 orders of magnitude. The study maintains that chemical analysis by gas chromatography is a valid method for distinguishing between indigenous and pollutant hydrocarbons in recent sediments. (Ensign-PAI)
W73-09898

STUDIES ON THE COASTAL OCEANOGRAPHY IN THE VICINITY OF FUKUYAMA, HIROSHIMA PREF., I. DISTRIBUTION PATTERNS OF TEMPERATURE, CHLORINITY, PH AND INORGANIC NUTRIENT (PHOSPHATE-P, AMMONIA-N, NITRITE-N, NITRATE-N) CONTENTS OF SEA WATER IN EARLY FEBRUARY, 1968, (IN JAPANESE),
Hiroshima Univ. (Japan). Dept. of Fisheries.
For primary bibliographic entry see Field 05B.
W73-09899

MERCURY IN FUR SEALS,
National Marine Fisheries Service, Seattle, Wash. Marine Mammal Biological Lab.
R. E. Anas.
Paper presented at Mercury in the Western Environment Workshop, Feb. 24-26, 1971. 4 fig, 8 ref.

Descriptors: *Mercury, *Mammals, *Laboratory tests, Animal physiology, Water pollution effects,

Analytical techniques, *Neutron activation analysis, Pollutant identification.
Identifiers: *Fur seals, Atomic absorption testing.

Fur seals (Callorhinus ursinus) off the Pribilof Islands, Alaska, were tested by flameless atomic absorption for mercury contamination. Liver, muscle and brain tissues were sampled from pup, young male and adult female seals. All of the samples contained mercury, though levels were higher in the liver tissue than muscle or brain. Mercury content in livers of the pups was 0.20 ppm, 10.8 ppm for young males and 67.2 ppm for the adult females. While increased mercury levels in liver tissue were significantly correlated with age, muscle tissue showed no such correlation. Brain tissues were analyzed by neutron activation; mercury values were higher using this method than those determined by atomic absorption. The sources of mercury contamination off the Pribilof Islands have not yet been identified. (Ensign-PAI)
W73-09901

NATURAL AND MANMADE HYDROCARBONS IN THE OCEANS,
Texas Univ., Port Aransas. Marine Science Inst.
For primary bibliographic entry see Field 05B.
W73-09907

A GUIDE TO MARINE POLLUTION.

Papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970. Rome, Italy 174 p. Published by Gordon and Beach, New York, 1972.

Descriptors: *Water pollution, *Pollutants, *Pollutant identification, Organic compounds, Chemicals, Nutrients, *Radioisotopes, *Monitoring, Analytical techniques.

The papers included in this seminar deal with problems of marine pollution. They present current knowledge of what substances are significant polluters and how to measure these substances. Broad categories of pullutants like hydrocarbons, organic and inorganic chemicals, nutrients, and radionuclides are discussed. Analytical techniques for identifying and quantifying these materials are reviewed. The usefulness and feasibility of small and large-scale monitoring systems are debated. The need for expanded and continued research in all areas of marine pollution is repeatedly stressed. (See W73-09916 thru W73-09924) (Ensign-PAI)
W73-09915

HALOGENATED HYDROCARBONS,
Canadian Wildlife Service, Ottawa (Ontario).
R. W. Risebrough, E. Huschenbeth, S. Jensen, and J. E. Portmann.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 1-17, 1972. 26 ref.

Descriptors: *Organic compounds, *Pollutant identification, Marine plants, Marine animals, *Analytical techniques, *Monitoring, Water pollution, Research and development, *Reviews, *Bioindicators.

The current state of knowledge concerning the distribution and accumulation of halogenated hydrocarbons in the sea is reviewed. It is now believed that some form of equilibrium exists between the level of organo-chlorine pollutants in water and their level in marine animals. However, present methodology is not capable of detecting the quantities of these compounds on a routine basis in the open sea. Techniques now in use to analyze the hydrocarbons are outlined and briefly described. Areas in which greater research is needed are enumerated. A discussion of existing monitoring systems is presented; criteria for expanded systems are developed within the context of the current state of methodology. (See also W73-09915) (Ensign-PAI)
W73-09916

PETROLEUM,
Woods Hole Oceanographic Institution, Mass.
M. Blumer, P. C. Blokker, E. B. Cowell, and D. F. Duckworth.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 19-40, 1972. 4 fig, 1 tab, 71 ref.

Descriptors: *Oceans, *Oil, *Oil pollution, *Distribution, *Organic compounds, Analytical techniques, Pollutant identification, Monitoring, Environmental effects.
Identifiers: *Marine ecosystems.

The complexity of the problem of petroleum pollution in sea water is discussed. Little information is available on the extent of pollution in different marine ecosystems; concentrations of pollutants vary from bulk oil to oil at very low concentration. Existing methods of hydrocarbon analysis of water, sediments and organisms are reviewed. Some of the techniques discussed include passive tagging, active tagging, mass spectrometry, and isolation of hydrocarbons. The possibility of determining a limited range of hydrocarbon standards and using automated analytical techniques are explored for the future. The concept of environmental monitoring is also covered. It is noted that a rapid method for examining large numbers of sites produces useful data more rapidly than very detailed counts in a limited number of areas. (See also W73-09915) (Ensign-PAI)
W73-09917

INORGANIC CHEMICALS,
Goeteborg Univ. (Sweden). Dept. of Analytical Chemistry.
D. Dyrssen, C. Patterson, J. Ui, and G. F. Weichert.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 41-58, 1972. 2 tab, 89 ref.

Descriptors: *Oceans, *Metals, *Mercury, *Lead, *Toxicity, Aquatic life, Distribution, Pollutant identification, Environmental effects, Beryllium, Iron, Cadmium, Copper, Zinc, Water pollutants effects.

The presence of heavy metals in marine waters is discussed. Since mercury and lead are considered to be the most threatening pollutants they are given special attention. The concentration of lead in the surface waters of the oceans in the Northern Hemisphere has increased by a factor of 5 above natural levels. Mercury concentrations are not as high; however, the tendency of mercury compounds to decompose into methyl mercury which then accumulates in marine organisms through the food chain makes it an especially hazardous metal. Other toxic metals are investigated, such as beryllium, iron, cadmium, copper and zinc. Methods for detecting the presence of metals in ocean water are described briefly. The need for improved analytical methods in area like multielement and automatic analysis is noted. (See also W73-09915) (Ensign-PAI)
W73-09918

ORGANIC CHEMICALS,
Stockholm Univ. (Sweden). Institutionen for Analytisk Kemi.
J. G. Widmark, W. D. Garrett, and K. H. Palmork.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 59-80, 1972. 5 fig, 4 tab, 26 ref.

Descriptors: *Oceans, *Organic compounds, *Pollutant identification, *Analytical techniques, *Sampling, Data collections, Chemicals, Water pollution effects.
Identifiers: Soluble pollutants, Insoluble pollutants, Biological response, Pollutant distribution.

The general problems associated with organic chemical pollutants are discussed. The difficulty of establishing the presence of pollutants against a background of naturally occurring carbon compounds is noted. The fact an organic compound may differ in response to various biological situations makes an exact definition of a pollutant difficult. Three primary categories of distribution of chemical pollutants in the sea are identified: water-soluble compounds, partly soluble but highly surface active compounds, hydrophobic and largely water insoluble compounds. Analytical techniques used to identify pollutants are reviewed. One method for the determination of soluble organic carbon is presented in some detail. A method for the collection of filmforming materials from the sea surface is separately discussed. (See also W73-09915) (Ensign-PAI)
W73-09919

NUTRIENT CHEMICALS (INCLUDING THOSE DERIVED FROM DETERGENTS AND AGRICULTURAL CHEMICALS),
Liverpool Univ. (England). Dept. of Oceanography.
J. P. Riley, K. Grasshoff, and A. Voipio.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 81-110, 1972. 5 fig, 13 ref.

Descriptors: *Oceans, *Nutrients, Water Pollution, *Pollutant identification, Methodology, Design, Mechanical equipment, *Detergents, *Agricultural chemicals.
Identifiers: *AutoAnalyzer, Micronutrients, Pollutant levels.

Several automated procedures using an AutoAnalyzer to determine the levels of nutrient elements in sea water are described. The methods used to identify micronutrients are outlined along with the means for determining levels of dissolved phosphorus and polyphosphates. Methodology involved in identifying nitrites, nitrates, nitrogen and silicon is discussed. The AutoAnalyzer, manufactured by Technicon Instruments Corp. offers a speedy method of nutrient analysis which can be adapted to large-scale surveys and detailed monitoring. The instrument consists of a number of modules in which samples are circulated and pumped with reagents. The mixed stream is circulated through glass helices to assist mixing of the sample and the reagents; no new reagents are added until the first reaction has proceeded to completion. Typical use of the AutoAnalyzer with silicates, phosphates, nitrites and nitrates is described. (See also W73-09915) (Ensign-PAI)
W73-09920

SUSPENDED SOLIDS AND TURBIDITY,
Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.
N. G. Jerlov, H. Postma, and B. Zeitschel.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 111-127, 1972. 20 ref.

Descriptors: *Oceans, *Suspended solids, *Turbidity, *Pollutant identification, Methodology, *Analytical techniques, *Reviews.

River transport, effluent discharges and dumping are the major pathways by which pollutants reach the ocean. Reliable identification of these wastes in turbid waters is possible only if the pollutants have specific characteristics, which they often do not. No method has been developed yet to identify and quantify only those particles is suspended

sediments which have been introduced by pollution. Techniques for determining suspended solids such as filtering, size distribution and various types of optical methods are described. Detection of pollutants in suspended matter must involve an identification of the substances by their physical and chemical nature. Current techniques are not sufficiently sophisticated to accomplish this. (See also W73-09915) (Ensign-PAI)
W73-09921

RADIOACTIVITY,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
A. Preston, R. Fukai, H. L. Volchok, N. Yamagata, and J. W. R. Dutton.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 129-146, 1972. 2 fig, 4 tab, 25 ref.

Descriptors: *Oceans, *Radioactivity, *Radioactive wastes, *Sampling, Aquatic life, Analytical techniques, Water pollution effects, Water pollution control, Monitoring, *Power plants.
Identifiers: Nuclear testing, *Gamma spectrometry, Environmental impact.

Environmental background levels of radiation have increased steadily as a result of nuclear testing and radioactive wastes from power plants. Nuclear fallout has resulted in low levels of radioactive contamination over wide ocean areas. Disposal of wastes from nuclear fission has resulted in high concentrations of radioisotopes in localized areas. The detection and measurement of radionuclides in the marine environment is discussed. For samples of seawater, biota, and sediments the final determination of the majority of radionuclides concerned can be performed by gamma-spectrometry. Chemical methods of separation for radionuclides which do not emit gamma radiation are described. Currently available methods for the detection and measurement of artificial radionuclides are adequate for the control of radioactive waste disposal. Fallout from nuclear explosions will not be of concern as long as testing continues at its present low level. (See also W73-09915) (Ensign-PAI)
W73-09922

TEST, MONITORING AND INDICATOR ORGANISMS,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Lab.
P. Butler, L. E. Andren, G. J. Bonde, A. B. Jerneloev, and D. J. Reish.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 147-159, 1972. 67 ref.

Descriptors: *Oceans, Marine animals, *Bioindicators, *Laboratory tests, *Monitoring, Marine plants, Pollutant identification, Water pollution effects.

Selected species from a marine environment useful for the detection and evaluation of pollution are discussed. The distinctions between monitoring, indicator, and test organisms are noted. Monitoring organisms are used primarily to quantify pollution levels; indicator organisms are used to identify pollutants; and test organisms are monitoring and/or indicator organisms which are small and easy to handle and culture. The usefulness of a particular species depends upon the type of information desired. Various species such as bacteria, phytoplankton, algae, molluscs, fish, birds and mammals are reviewed in terms of the roles they can play in environmental monitoring. The need for further research on test, monitoring, and indicator organisms is stressed. Information on life histories, sensitive life stages, trophic webs, population fluctuations, etc. is inadequate at present. (See also W73-09915) (Ensign-PAI)
W73-09923

DESIGN OF A WORLD MONITORING SYSTEM,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
A. J. Lee, E. Eriksson, I. J. Haahtela, B. G. Lundholm, and S. Mizuno.
In: A Guide to Marine Pollution, papers presented at Food and Agriculture Organization Seminar, December 4-10, 1970, p 161-168, 1972. 16 ref.

Descriptors: *Oceans, *Pollutant identification, *Monitoring, *Planning, *Management, *Water pollution control, Data collections.

There are three possible types of monitoring, local, regional and global. The structure of a global system is discussed. Such a system would include a network of base-line stations, of impact stations, remote sensing systems and special systems. Baseline stations would chronicle large-scale changes; impact stations would measure the most marked changes and be sited in areas where such changes would be harmful to the marine environment; remote sensing systems, such as satellites would allow some feature of the ocean to be viewed on a global scale; and special systems would include the use of species to indicate the level of certain pollutants in various geographical areas. Implementing a global monitoring system would entail a preliminary exploratory survey, a determination of specific substances to be monitored, a decision on the frequency of sampling, and a free exchange of data among the nations of the world. (See also W73-09915) (Ensign-PAI)
W73-09924

SAMPLER-CULTURE APPARATUS FOR THE DETECTION OF COLIFORM BACTERIA IN POTABLE WATERS,
A. A. Hirsch.
US Patent No 3,708,400, 4 p, 6 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 906, No 1, p 260, January 2, 1973.

Descriptors: *Patents, *Pollutant identification, *Coliforms, Bacteria, *Potable water, *Public health, Laboratory equipment.

Improvements are described for a specialized apparatus for determining the presence of coliform bacteria in potable waters, raw reservoir water, shellfish beds, and in other aqueous environments in which low density of these bacteria is imperative. A go-on-go gage determines directly whether bacterial quality of a drinking water sample meets the U.S. Public Health Service Standards; all laboratory manipulations are eliminated from sampling to gas observations. The apparatus is creep-proof; it avoids exposures and operations are precise. Gas from fermentation shows in a Durham vial held diagonally in a screw cap bottle either by being clamped in a cage or by a tailrod, both methods eliminating all axial and lateral motion. A confirmatory Brilliant Green Bile broth tube is seeded by pressing into the screw cap and inverting, thus obviating all extraneous utensils throughout the procedure. (Sinha-OEIS)
W73-09945

A SYSTEM FOR REMOTE TELEMETRY OF WATER QUALITY DATA,
Maine Univ., Orono. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 07B.
W73-09946

EFFECTS OF FLUORINE IN CATTLE: A SUMMARY OF RESULTS OF STUDIES OVER A NUMBER OF YEARS IN THE NEIGHBORHOOD OF A HYDROFLUORIC ACID FACTORY AND AN ALUMINUM FACTORY (IN GERMAN),
Tieraerztlichen Hochschule, Hanover (West Germany).
For primary bibliographic entry see Field 05C.
W73-09991

IN SITU DISSOLVED OXYGEN MEASUREMENTS IN THE NORTH AND WEST ATLANTIC OCEAN,
Rhode Island Univ., Kingston. Graduate School of Oceanography.
R. B. Lambert, Jr., D. R. Kester, M. E. Q. Pilson, and K. E. Kenyon.
Journal of Geophysical Research, Vol 78, No 9, p 1479-1483, March 20, 1973. 2 fig, 13 ref. NSF Grant GA27272 ONR Grant N00014-68-A-0215-0003.

Descriptors: *Dissolved oxygen, *Atlantic Ocean, Mixing, Ocean currents, Ocean circulation, Profiles, Mass transfer, Density stratification, Water temperature.

Continuous vertical profiles of dissogved oxygen were obtained between Iceland and Nove Scotia and between Bermuda and Cape Hatteras. Small-scale variability was observed between the main oxygen minimum and the surface layer. Continuous profiling of dissolved oxygen is useful in studying small-scale mixing as well as large-scale water mass transport. (Knapp-USGS)
W73-10042

WATER QUALITY OF COLORADO RIVER (PROVINCE BUENOS AIRES) USED IN IRRIGATION, (IN SPANISH),
Universidad Nacional del Sur, Bahia Blanca (Argentina).
For primary bibliographic entry see Field 05B.
W73-10089

ESTUARINE SURVEYS IN THE SOUTHEAST,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05B.
W73-10106

PETROLEUM HYDROCARBONS IN OYSTERS FROM GALVESTON BAY,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
M. Ehrhardt.
Environmental Pollution, Vol 3, p 257-271, 1972. 11 fig, 32 ref.

Descriptors: *Oil wastes, Water pollution effects, Environmental effects, *Oysters, Chromatography, *Gas chromatography, *Texas, Pollutant identification.
Identifiers: *Hydrocarbons, Aliphatic hydrocarbons, Aromatic hydrocarbons, *Galveston Bay.

Oysters from Galveston Bay, Texas were analyzed for petroleum-derived hydrocarbons. The lipids and hydrocarbons were Soxhlet-extracted with benzene/methanol and then partitioned into n-pentane. Separation of hydrocarbons from lipids was done by column chromatography on a bed of silicagel covered by alumina. These absorbents were deactivated to prevent the formation of artifacts from sensitive components of the lipid fraction. The column effluent was then resolved into aliphatic, mono-, di-, and tri- aromatic hydrocarbons by preparative TLC on activated silicagel. Identification of compounds and compound types was made from their gas chromatographic retention indices, mass spectra, and UV spectra. Severe oil contamination of the oysters was apparent. Aliphatic hydrocarbon concentration distribution was similar to the distribution found in a crude oil. Contaminated oysters had higher concentrations of alicyclic and aro-

matic hydrocarbons than the uncontaminated oysters. (EnsignnPAI)
W73-10117

DETERMINATION OF THE YIELD BY LIQUID SCINTILLATION OF THE 14C IN THE MEASUREMENT OF PRIMARY PRODUCTION IN A LAGOON ENVIRONMENT, (DETERMINATION DES RENDEMENTS DU COMPTAGE PAR SCINTILLATION LIQUIDE DU 14C DANS LES MESURES DE PRODUCTION PRIMAIRE EN MILIEU LAGUNAIRE).
For primary bibliographic entry see Field 05C.
W73-10137

TRACE METALS IN CORES FROM THE GREAT MARSH, LEWES, DELAWARE,
Delaware Univ., Newark. Dept. of Geology.
R. N. Strom, and R. B. Biggs.
College of Marine Studies Report No. 2 GL-105, December, 1972. 29 p, 12 fig, 1 tab, 7 ref. NOAA 2-35223.

Descriptors: *Bays, *Sediments, *Trace elements, Cores, Sampling, Zinc, Copper, Chromium, Iron, Cadmium, *Delaware, *Metals.
Identifiers: *Great Marsh (Del).

A study was undertaken to determine the areal and vertical changes in trace metal concentrations in sediments deposited before the industrialization of the Delaware Bay watershed. Sediment core samples were taken by hand driving plastic pipe sections into the sediment. The samples were analyzed for zinc, copper, chromium, iron, lead and cadmium. The levels of lead and cadmium were less than 1 ppm in the sediment sample. No significant changes with depth could be found for copper or chromium, while zinc concentrations increased slightly with depth. The concentration of trace metals in the <63 micrometer fraction and the >63 micrometer fraction did not differ significantly, contrary to expectations. (Ensign-PAI)
W73-10141

AERIAL EXPERIMENTS OF RADIOMETRIC DETECTION OF HYDROCARBON DEPOSITS IN THE SEA, (EXPERIENCES AERIENNES DE DETECTION RADIOMETRIQUE DE NAPPES D'HYDROCARBURES EN MER).

Bulletin d'Information, Centre National Pour l'Exploitation des Oceans, Republique Francaise, No 40, p 15-16, April 1972.

Descriptors: *Organic compounds, *Oil spills, Research and development, Programs, Monitoring, Ships, Accidents, Discharge measurement, *Remote sensing, Pollutant identification.
Identifiers: *Oil spill detection, *Radiometric detection, Radiometers, Barns, Super-Cyclope.

Experiments with aerial radiometric detection of hydrocarbon spills in the sea were conducted by the Centre National pour l/exploitation des Oceans and a research group from the ministry of National Defense. Two types of radiometers were used: Barns and Super-Cyclope. The experiments constituted the first phase of a research and development program to assure the surveillance of oil spills originating from shipwrecks of petroleum ships as well as the detection of fraudulent discharges made by ships in operation. (Ensign-PAI)
W73-10148

A NEW APPROACH TO THE MEASUREMENT OF RATE OF OXIDATION OF CRUDE OIL IN SEAWATER SYSTEMS,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 05B.
W73-10150

RADIATION DATA, SECTION II, WATER.
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10181

POTENTIALITIES AND LIMITS OF MULTIELEMENT NEUTRON ACTIVATION ANALYSIS OF BIOLOGICAL SPECIMENS WITH OR WITHOUT SEPARATION FROM AN ACTIVE MATRICE, (POSSIBILITIES ET LIMITES DE L'ANALYSE PAR ACTIVATION NEUTRONIQUE MULTIELE MENTAIRE D'ECHANTILLONS BIOLOGIQUES AVEC OU SANS SEPARATION DE LA MATRICE ACTIVABLE.),
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
B. Maziere, A. Gaudry, W. Stanilewicz, and D. Comar.
Available from NTIS, Springfield, Va., as 721010-26; $3 in paper copy, $0.95 in microfiche. Report CONF-721010-26, 1972. 22 p, 4 fig, 4 tab, 8 ref.

Descriptors: *Radioactivity techniques, *Analytical techniques, *Neutron activation analysis, *Bioindicators, *Pollutant identification, *Trace elements, Gamma rays, Spectrometry, Separation techniques, Ion exchange, Radiochemical analysis.

Eight essential-nutrient trace elements were determined in blood serum and powdered liver. Chemical separation was not required for Fe, Co, Zn and Se; chemical-separation methods requiring a few hours were used with Mn and Cu; more extensive chemical methods were used with Mn and Cr. A total of 43 trace elements were determined of which precise values were obtained for 12, and upper limits for the remainder. The determination of Yb, Th, Ir, Cd, Au, Hf, Ru, Sb, Sc, Tb, Ta, and Eu was not as sensitive as by other methods. (Bopp-ORNL)
W73-10184

ENVIRONMENTAL SURVEILLANCE FOR RADIOACTIVITY IN THE VICINITY OF THE CRYSTAL RIVER NUCLEAR POWER PLANT, AN ECOLOGICAL APPROACH,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
For primary bibliographic entry see Field 05B.
W73-10185

ANNUAL ENVIRONMENTAL MONITORING REPORT: CALENDAR YEAR 1972,
Mound Lab., Miamisburg, Ohio.
For primary bibliographic entry see Field 05B.
W73-10201

ENVIRONMENTAL LEVELS OF RADIOACTIVITY IN THE VICINITY OF THE LAWRENCE LIVERMORE LABORATORY: 1972 ANNUAL REPORT,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 05B.
W73-10202

ENVIRONMENTAL MONITORING AT ARGONNE NATIONAL LABORATORY - ANNUAL REPORT FOR 1972,
Argonne National Lab., Ill.
J. Sedlet, N. W. Golchert, and T. L. Duffy.
Available from NTIS, SPringfield, Va., as Report No ANL-8007; $3.00 per copy, $0.95 microfiche. Report No ANL-8007, March 1973. 68 p, 5 fig, 26 tab, 22 ref, 1 append.

Descriptors: *Monitoring, *Environment, *Safety, *Public health, *Radioactivity, Air pollution, Water pollution, Soil contamination, Water pollution sources, Fallout, Effluents, Nuclear wastes, Aquatic algae, Aquatic animals, Milk, Food chains.

The environmental monitoring program at Argonne National Laboratory for 1972 is described and the results are presented. To evaluate the effect of Argonne operations on the environment, measurements were made for a variety of radionuclides in air, surface water, soil, grass, benthos, and milk; for a variety of chemical constituents in surface and Argonne effluent water; and for the environmental penetrating radiation dose. Sample collections and measurements were made both on and off the Argonne site for comparison purposes. The results of the program are interpreted in terms of the sources and origin of the radioactive and chemical substances (natural, fallout, Argonne, and other) and are compared with accepted environmental quality standards. (Houser-ORNL)
W73-10206

RADIOACTIVITY OF THE WATER OF THE NORTHEASTERN PART OF THE ATLANTIC OCEAN,
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
For primary bibliographic entry see Field 05B.
W73-10220

A STUDY OF THE COST EFFECTIVENESS OF REMOTE SENSING SYSTEMS FOR OCEAN SLICK DETECTION AND CLASSIFICATION,
New Hampshire Univ., Durham. Dept. of Electrical Engineering.
G. C. Gerhard.
Sea Grant Programs Report No UNHSG-101, EDAL Report No 112, April 1972. 26 p, 3 fig, 5 ref. UNHSG-2-35244.

Descriptors: *Water pollution, *Pollutant identification, *Oil spills, *Remote sensing, Surveys, Monitoring, Instrumentation, *Costs.

A 5-month investigation concerning the uses of, and the need for, remote sensing devices and techniques to be applied to the oil slick detection and classification problem is reported. The current U.S. Coast Guard surveillance system, consisting of daytime visual spottings by patrol helicopter pilots, is evaluated. A sensor system which allows only a 1 to 5% improvement in detection capability can in a 1-yr period justify reasonable costs for technical feasibility studies and prototype development work. Other needs such as improved oil slick thickness monitoring capabilitiies and nighttime identification techniques warrant further study and development to realize significant improvements in the cost effectiveness of sensor packages. The type of instruments and sensor packages based on Coast Guard requirements and availability, as well as the best obtainable cost estimates, are reviewed. (Ensign-PAI)
W73-10228

THE SOURCE IDENTIFICATION OF MARINE HYDROCARBONS BY GAS CHROMATOGRAPHY,
Woods Hole Oceanographic Institution, Mass.
M. Ehrhardt, and M. Blumer.
Environmental Pollution, London, Vol 3, p 179-194, July 1972. 8 fig, 2 tab, 21 ref. NSF-GA-19472, EPA-18050 EBN.

Descriptors: *Pollutant identification, *Organic compounds, *Chromatography, *Seawater, *Oil spills, Oil, Degradation (Decomposition), Evaporation, Bacteria, Weathering.
Identifiers: Dissolution, Oil compositional parameters.

A method for the source identification of oil spills by gas chromatographic analysis is described. The compositional parameters for eight different crude oils are given. The environmental degradation of oil by evaporation, dissolution, and bacteria decomposition is discussed. Distinguishing compositional features are still recognizable after more

than 8 mo. of weathering. The tentative source identification of 2 samples of beach tar demonstrates the potential applicability of the method. For serious application a far larger number of chromatograms of crude oils, oil products and oil blends must be considered. Further improvement and extension of the method by application of highly efficient capillary columns and mass spectrometry is planned. (Ensign-PAI)
W73-10237

MERCURY IN SOME SURFACE WATERS OF THE WORLD OCEAN,
Liverpool Univ. (England). Dept. of Oceanography.
R. Chester, D. Gardner, J. P. Riley, and J. Stoner.
Marine Pollution Bulletin, London, Vol 4, No 2, p 28-29, February 1973. 1 fig, 1 tab.

Descriptors: *Oceans, *Mercury, *Atlantic Ocean, Indian Ocean, Pollutant identification.
Identifiers: China Sea, Inland Sea, Java Sea, Japan Coast, African coast.

Mercury concentrations in the Atlantic Ocean, Indian oceans, China Sea, and various nearshore localities (Inland Sea, Java Sea, Japanese coast, and South African coast) were investigated. Values for 28 samples are given. Mercury concentrations in mid-latitude eastern Atlantic surface waters are about twice as high as the oceanic average, perhaps due to pollution. Low concentrations in the tropical Atlantic may be due to uptake by plankton off the west coast of Africa. (Ensign-PAI)
W73-10242

TRACE METAL ENVIRONMENTS NEAR SHELL BANKS IN DELAWARE BAY,
Delaware Univ., Newark. Dept. of Geology.
For primary bibliographic entry see Field 05B.
W73-10250

ENVIRONMENTAL RADIOACTIVITY IN MICHIGAN, 1970,
Office of Radiation Programs, Washington, D.C.
S. Wieder, J. E. Logsdon, and C. P. Froom.
Radiation Data and Reports, Vol 13, No 1, p 3-18, January 1972. 1 fig, 15 tab, 19 ref.

Descriptors: *Michigan, *Radioactivity, *Radioactivity effects, *Nuclear power plants, Radiation, Energy, Nuclear reactors, Radioactive wastes, Environmental effects, Public health, Thermal pollution, Water pollution effects, Balance of nature, Hazards, Nuclear energy, Nuclear physics, Radiation, Water quality, Ultimate disposal, Electric power plants, Nuclear engineering, Electric power production, Administrative agencies.
Identifiers: *Environmental surveillance.

Radioactivity data from all major sources measured in the Michigan environment during 1970 are summarized. State's environmental surveillance programs and the data resulting from these programs are described. Surveillance data provided by federal, state, operator and contractor sources are summarized. On the basis of this information, an estimate is presented of annual radiation doses to the population of Michigan. A summary of some operating characteristics of Big Rock Point, Enrico Fermi-I, and Palisades nuclear power plants is presented. Charts and tables are included. (Dunham-Florida)
W73-10262

A REVIEW OF METHODS FOR PREDICTING AIR POLLUTION DISPERSION,
National Aeronautics and Space Administration, Hampton, Va. Langley Research Center. National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
J. J. Mathis, Jr., and W. L. Grose.
Available from NTIS, Springfield, Va. 22151. NASA SP-322 Price $3.00.

Descriptors: *Air pollution, *Air pollution effects, *Pollution abatement, Control, Model studies, *Dispersion, Testing procedures, *Reviews, Evaluation, Diffusion, Aircraft, Meteoric water, Bibliographies.
Identifiers: *Atmospheric pollution dispersion, Aircraft emissions.

A survey was performed to identify problem areas in modeling air pollution dispersion and to summarize the current state of the art for these areas. Included are a summary of previous urban dispersion models, a review of the underlying concepts and assumptions, the techniques employed, and recommended research efforts which potentially can improve the ability to predict the dispersion of pollutants in the atmospheric boundary layer. Specific recommendations are made for utilizing these models to study the effects of pollutant contributions resulting from aircraft operations. Emphasis is on areas which are of direct concern to NASA or to which NASA's expertise could readily be applied. (Woodard-USGS)
W73-10324

BIOXIDATION OF WASTE IN ACTIVATED SLUDGE: I. MEASURING OXYGEN RESPIRATION OF ACTIVATED SLUDGE BY MEANS OF POLAROGRAPHIC AND OXYGEN PROBE METHODS,
G. Buraczewski, and A. Rotowska.
Acta Microbiol Pol Ser B Microbiol Appl. Vol 3, No 2, p 121-124, 1971. Illus.
Identifiers: *Activated sludge, Electrochemical methods, Measuring methods, *Polarographic method, Respiration, Sludge, Waste water treatment, *Oxygen probe, *Bioxidation.

Two electrochemical methods, using polarography and an oxygen probe, were tested. Experiments and apparatus are described. Both methods can be used for respiration experiments of activated sludge. The oxygen probe by Todt or a modified measuring technique using the polargraphic method should be used because smaller discrepancies in measuring results. Micro devices allow for a constant flow of activated sludge synchronized with the movement of the register tape inside the polarograph.--Copyright 1972, Biological Abstracts, Inc.
W73-10387

BACTERIOLOGICAL FINDINGS IN LAKE, RIVER AND WELL WATER SUPPLIES OF RANGOON,
Institute of Medicine (I), Rangoon (Bruma). Dept. of Microbiology.
S. Hila-Gyaw, K. Sann-Myint, H. Chen, and M. Tu.
Union Burma J Life Sci. Vol 4, No 1, p 95-103. 1971. Illus.
Identifiers: Alcaligenes-faecalis, Baxillus-sp, *Bacteriological studies, *Burma (Rangoon), Citrobacter-freundii, Clostridium-perfringens, Enterobacter-aerogenes, Escherichia-coli, Klebsiella-aerogenes, Proteus-mirabilis, Proteus-morganii, Proteus-vulgaris, Providencia, Pseudomonas-aeruginosa, Pseudomonas-fluorescens, Streptococcus-faecalis, *Water supply.

Water samples, both unchlorinated and chlorinated, from 20 natural water sources in Rangoon towns comprising lakes, river and wells were examined during the period July 1966 to July 1968 for the Presumptive Coliform Count, the Presumptive Enterococcus Count and the presence of presumptive Clostridium perfringens. Bacteria isolated from MacConkey bile salt lactose peptone water and sodium azide medium primary cultures were identified. Using as criteria the Presumptive Coliform Count, the Presumptive Enterococcus Count and the isolation of Escherichia coli and/or Klebsiella aerogenes and/or Streptococcus faecalis, 18 out of 20 samples were found unsatisfactory for drinking purposes. The bacteria isolated were E. coli, K. aerogenes, Citrobacter freundii, Enterobacter aerogenes, Alcaligenes faecalis, a Bacillus sp., Proteus mirabilis, P. morganii, P. vulgaris, a Providencia strain, Pseudomonas aeruginosa, P. fluorescens and S. faecalis.--Copyright 1972, Biological Abstracts, Inc.
W73-10391

5B. Sources of Pollution

PHYSICAL AND CHEMICAL PROPERTIES OF THE COASTAL WATERS OF GEORGIA,
Georgia Univ., Sapelo Island. Marine Inst.
For primary bibliographic entry see Field 02L.
W73-09752

NUTRIENT TRANSPORT BY SEDIMENT--WATER INTERACTION,
Illinois Univ., Chicago. Dept. of Materials Engineering.
For primary bibliographic entry see Field 05C.
W73-09754

WATER AND WASTEWATER MANAGEMENT IN DAIRY PROCESSING,
North Carolina State Univ., Raleigh. Dept. of Food Science.
R. E. Carawan, V. A. Jones, and A. P. Hansen.
Available from the National Technical Information Service as PB-220 704 $3.00 in paper copy, $0.95 in microfiche. North Carolina Water Resources Research Institute, Raleigh, UNC-WRRI Report No 79, December 1972. 132 p, 19 fig, 20 tab, 21 ref, 4 append. OWRR A-058-NC (1). 14-31-0001-3533.

Descriptors: *Dairy Industry, *Food Processing Industry, Water conservation, *Waste disposal, *Municipal wastes, Industrial water, *North Carolina, *Water utilization, Biochemiacal oxygen demand, Effluents, Industrial wastes.
Identifiers: *Milk processing.

A typical North Carolina multi-product plant was evaluated for water use and wastewater effluent quantities and characteristics. The maximum rate of milk usage was 40,000 gal/day. Water use totaled 325.5 gal/1000 lb total product with the processing areas requiring 311.4 gal/1000 lb total product. The largest water use operation was utilities which accounted for 38.8% of the total process water. The effluent was sampled at two locations in the process drain system with the frozen products area contributing 54% of the BOD and 69% of the fat for only 11% of the plant production. Waste parameters identified included BOD, 7.34 lb/1000 lb product (2257 mg/l); TSS, 3.59 lb/1000 lb product (1104 mg/l) and Fat, 2.34 lb/1000 lb product (720 mg/l). Effluent temperatures were monitored and averaged 95-100 F for the fluid products and by-products drain and 85-90 F for the frozen products drain. The average BOD/COD ratio was 0.64. BOD/TOC values ranged from 0.74-2.22 for limited data. Wide variation was observed in the day-to-day water use, waste discharge and production of products. A program is presented to help dairies reduce their water use and waste generation. This program stresses the need for minimum water use and waste discharge to achieve economic and environmental goals.
W73-09755

REPORT ON POLLUTION OF THE ST. MARYS AND AMELIA ESTUARIES, GEORGIA--FLORIDA,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
T. P. Gallager.

Available from NTIS, Springfield, Va. 22151, PB-213 349; Price $3.00 printed copy; $0.95 microfiche. EPA report, August 1971. 51 p, 7 fig, 4 tab, 2 append.

Descriptors: *Water pollution sources, *Estuaries, *Georgia, *Florida, Chemical analysis, Pollutant identification, Industrial wastes, Municipal wastes, Sampling, Water analysis, Dissolved oxygen, Biochemical oxygen demand, Coliforms, Water quality.
Identifiers: *St. Marys Estuary, *Amelia Estuary.

Survey results indicate that pollution of the St. Marys and Amelia Estuaries in Georgia and Florida have resulted in deleterious water quality. Data are based on the results of water quality surveys conducted by the Federal Water Pollution Control Administration in 1967. More than 982,000 population equivalents (PE) of 5-day biochemical oxygen demand were discharged into these waters--710,000 PE (72%) into Florida waters and 272,000 PE (28%) into Georgia waters. Untreated wastes discharged from industries and municipalities caused dissolved oxygen in the Amelia River to be depleted to a mean value of 2.0 mg/liter with a minimum observed value of 0.6 mg/liter. Total coliform bacteria densities in the Amelia River exceeded 1,000/100 ml which was considered minimal for direct contact recreation. Pollution from waste discharges limits the use of the river for recreation and fishing activities. (Woodard-USGS)
W73-09788

KINETICS OF CARBONATE-SEAWATER INTERACTIONS,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 02K.
W73-09790

INVESTIGATIONS AND FORECAST COMPUTATIONS FOR THE CONSERVATION OF GROUNDWATER (ISSLEDOVANIYA I PROGNOZNYYE RASHETY DLYA OKHRANY PODZENMYKH VOD),
Ye. L. Minkin.
Izdatel'stvo 'Nedra', Moscow, 1972. 110 p.

Descriptors: *Hydrogeology, *Groundwater, *Water conservation, *Water pollution, *Path of pollutants, Water pollution sources, Pollutants, Pollutant identification, Water pollution control, Water quality, Water chemistry, Aquifers, Water wells, Groundwater mining, Withdrawal, Industrial plants, Mathematics, Equations, Maps, Investigations, Forecasting.
Identifiers: *USSR, Mineralization.

Sources of pollution and pathways by which pollutants move through groundwater are examined for a classification of groundwater contamination conditions. Hydrogeological investigations to justify measures for the protection of groundwater from pollution are described, and hydrogeological computations are given for forecasting possible changes in groundwater quality in regions of withdrawals. (Josefson-USGS)
W73-09802

HYDROCHEMICAL TYPING OF RIVER BASINS OF THE UKRAINE,
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
A. D. Konenko, and N. M. Kuz'menko.
Hydrobiological Journal, Vol 8, No 1, p 1-10, 1972. 1 fig, 1 tab, 24 ref.

Descriptors: *Water chemistry, *Water quality, *River basins, Rivers, Streams, Ponds, Organic compounds, Inorganic compounds, Salts, Salinity, Ions, Water pollution, Investigations.
Identifiers: *USSR, *Ukraine.

Tabulation of hydrochemical characteristics of river basins is based on long-term, large-scale investigations of the hydrochemistry of Ukrainian rivers and ponds. The salt composition of the waters of small rivers is reflected in the different types of basins described. The influence of man is reflected in the sporadic increase in chloride and sulfate concentrations and in the sharp increase in concentrations of biogenic and organic substances. Small rivers of the Ukraine are polluted by household wastes, which results in eutrophication of reservoirs and ponds. Municipal sewage discharge and runoff from fertilized fields result in higher ammonium, nitrate, and phosphorus concentrations and in a high oxidation potential of the water. Manmade salinization is most evident in rivers of the Dnieper steppe, Dnieper-Donetsk steppe, Donets steppe, and Azov region. Man-induced salinization is less apparent in regions with abundant moisture. (Josefson-USGS)
W73-09811

RATIO OF ORGANIC AND MINERAL COMPONENTS OF THE SOUTH BAIKAL SUSPENDED WATERS (IN RUSSIAN),
E. N. Tarasova.
Gidrobiol Zh. Vol 8, No 1, p 17-25. 1972. Illus. English summary.
Identifiers: *Lake Baikal, Melosira, *Minerals, *Organic matter, Suspended solids, Synedra, USSR, Water pollution sources.

Data are presented for the first time on the range of total amount of suspensions in the surface layer of Lake Baikal. Seasonal changes in ratios of mineral and organic components of the suspension are considered by the vertical line and the role of the Baikal endemic diatoms (Melosira and Synedra) is estimated in suspended organic matter of waters in the open part of the lake. Increased concentrations of suspended organic matter were found near the littoral zone and in deep water they were found in May and Aug. of 1968. The ratio of mineral and organic components of the suspension undergoes distinct seasonal changes. The phytoplankton in the period of its mass development (spring) is not constant in suspended organic matter.--Copyright 1972, Biological Abstracts, Inc.
W73-09812

METROPOLITAN COMPREHENSIVE WATER, SEWAGE, AND SOLID WASTE PLANNING STUDY.
Bi-State Metropolitan Planning Commission, Rock Island, Ill.
For primary bibliographic entry see Field 06A.
W73-09829

THE DISSIPATION OF EXCESS HEAT FROM WATER SYSTEMS,
Geological Survey, Bay St. Louis, Miss.
H. E. Jobson.
Journal of the Power Division, American Society of Civil Engineers, Vol 99, No P01, Proceedings paper 9702, p 89-103, May 1973. 1 fig, 1 tab, 35 equ, 16 ref.

Descriptors: *Thermal pollution, *Water temperature, *Mathematical models, *Heat transfer, Predicting, Equations, *Diffusion, Humidity, Air temperature, Water resources.
Identifiers: Heat transmission, Wind speed.

A model for the prediction of excess temperature is shown to have the form of the classical diffusion equation. The excess temperature in this model is defined as the difference between the actual water temperature and the water temperature which would have occurred provided that a particular heat source, such as a power plant, had never existed. This definition of excess temperature is convenient because it directly represents the incremental effect that a heat source has on a water system and, provided that historical water temperature records are available, the excess temperature can be predicted without the use of solar or atmospheric radiation data. A prediction equation for the surface transfer coefficient for excess heat illustrates that this coefficient is primarily dependent upon the water temperature and wind speed, and that it is almost independent of the humidity and temperature of the air. (Bell-Cornell)
W73-09839

THERMAL CAPACITY OF OUR NATION'S WATERWAYS,
Westinghouse Hanford Co., Richland, Wash.
For primary bibliographic entry see Field 05G.
W73-09840

OPTIMIZATION OF CIRCULATING WATER SYSTEM,
Worcester Polytechnic Inst., Mass.
For primary bibliographic entry see Field 05G.
W73-09842

QUALITATIVE COMPOSITION OF ORGANIC SUBSTANCE IN WATERS OF THE DNIEPER RESERVOIRS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Hidrobiologii.
G. A. Enaki.
Gidrobiol Zh. Vol 8, No 1, p 26-31, 1972. English summary.
Identifiers: *Amino-Acids, *Carbohydrates, *Dnieper reservoirs, Organic matter, Qualitative analysis, Reservoirs, USSR, Water pollution sources.

The amino acid and carbohydrate contents in the Dnieper cascade reservoirs which have arid and dry climate was higher than in the Kiev reservoir. The tendency to increase in the content of biochemically available compounds in the reservoir waters down the cascade was observed.--Copyright 1972, Biological Abstracts, Inc.
W73-09843

THERMAL EFFECTS OF PROJECTED POWER GROWTH: SOUTH ATLANTIC AND EAST GULF COAST RIVER BASINS,
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05C.
W73-09848

THE CASE FOR THERMAL POLLUTION,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 05G.
W73-09864

SIMPLIFIED MATHEMATICAL MODEL OF TEMPERATURE CHANGES IN RIVERS,
Associated Water and Air Resources Engineers, Inc., Nashville, Tenn.
V. Novotny, and P. A. Krenkel.
Journal Water Pollution Control Federation, Vol 45, No 2, p 239-248, February 1973. 3 fig, 7 ref, 2 append. EPA Grant 1642-11.

Descriptors: *Mathematical models, Equations, Flow, *Heat transfer, Streams, Hydraulic models, Hydraulic engineering, Model studies, Fluid mechanics, Analytical techniques, Theoretical analysis, Movement, Energy, Radiation, Temperature, *Thermal pollution, Heated water, Discharges (Water), Rivers, *Water temperature.

Mathematical models for describing stream temperature changes which are based on studies of evaporation phenomena in lakes are seen as inadequate because they fail to take the dynamic behavior of the air-water interface, water body size differences or topographical differences into account. Theoretical equations are presented for

heat transfer in flowing fluids which combine convective motion and radiation transfer with emission, scattering and absorption of radiative energy. The equations for continuity, motion and energy are written in vector form and a heat transfer model is developed. Because of turbulence occurring at the water surface the water surface renewal coefficient is several orders of magnitude greater than the overall air boundary heat transfer coefficient. The magnitude of heat exchange is primarily determined by the magnitude of the air coefficient. The overall heat-exchange coefficient is dependent only on the wind velocity, the stream surface velocity, the air temperature and to a lesser degree the size of the water surface. (Jerome-Vanderbilt)
W73-09867

POLLUTION POTENTIAL OF RUNOFF FROM PRODUCTION LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
J. N. Dornbush, and J. M. Madden.
Available from National Technical Information Service as PB-220 752, $3.00 in paper copy, $0.95 in microfiche. South Dakota Water Resources Institute, Brookings, Completion Report, April 1973. 37 p, 3 fig, 12 tab, 12 ref. OWRR A-025-SDAK (5). 14-01-001-1862.

Descriptors: Runoff, Nutrients, Rainfall-runoff relationships, Snowmelt, Biochemical oxygen demand, Chemical oxygen demand, Pollutants, *Farm wastes, *South Dakota, *Feed lots, *Solid wastes.

The quantity and quality of runoff from six feedlots in eastern South Dakota has been measured over a 3-year period. Annual precipitation at the feedlots ranged from 19 to 25 inches which was about normal for the area. Snowmelt accounted for 27% of the mean runoff of 7.2 inches for the six lots. After snowmelt runoff, rainfall caused only about 10 runoff events per year and about 50% of the runoff events were less than 0.25 inches. Average annual losses of waste constituents in the runoff in lbs/acre/yr. were total solids - 10,332, BOD-1816, COD-7496, total phosphate - 351, and Kjeldahl nitrogen - 533, although there was wide variation between lots. Removal of solids from the runoff would reduce the pollution potential by about 35% for most constituents. Less than 5% of the total waste generated on a lot was removed with surface runoff. Minimum detention facilities, diverting foreign drainage and reduction of runoff velocities will reduce the pollution potential to less than 2% of the total animal wastes produced. (Wiersma-South Dakota State)
W73-09872

ANALYSIS OF THE INJECTION OF A HEATED, TURBULENT JET INTO A MOVING MAINSTREAM, WITH EMPHASIS ON A THERMAL DISCHARGE IN A WATERWAY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
J. F. Campbell, and J. A. Schetz.
Completion Report VIP-E-72-24, December 1972. 181 p, 57 fig, 5 tab, 36 ref, 3 append. OWRR B-041-VA (2).

Descriptors: *Thermal pollution, *Turbulent flow, *Mixing, *Jets, *Water temperature, Water pollution sources, Discharge (Water), Effluents, Path of pollutants.

An experimental and theoretical investigation has been undertaken to study the trajectory and growth of thermal effluents having a range of discharge velocities and temperatures. The discharge of a turbulent effluent into a waterway was mathematically modeled as a submerged jet injection process by using an integral method which accounts for natural fluid mechanisms such as turbulence, entrainment, buoyancy, and heat transfer. The analytical results are supported by experimental data and demonstrate the usefulness of the theory for estimating the location and size of the effluent with respect to the discharge point. The capability of predicting jet flow properties, as well as two- and three-dimensional jet paths, was enhanced by obtaining the jet cross-sectional area during the solution of the conservation equations (a number of previous studies assume a specific growth for the area). Realistic estimates of temperature in the effluent were acquired by accounting for heat losses in the jet flow due to forced convection and to entrainment of free-stream fluid into the jet.
W73-09876

ARTIFICIAL RADIOACTIVITY IN FRESH WATER AND ESTUARINE SYSTEMS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
A. Preston.
Proceedings of the Royal Society of London, Series B, Vol 180, p 421-436, 1972. 6 fig, 6 tab, 54 ref.

Descriptors: *Estuaries, Freshwater, *Radioactivity, Behavior, *Nuclear wastes, *Waste disposal, Water pollution control, Data collections, Control systems, Safety, Standards, *Estuarine environment.
Identifiers: *United Kingdom.

The nature and origin of artificial radioactivity in freshwater and estuarine environments are described. Man-made sources, such as atmospheric nuclear tests, residues associated with nuclear weapon production and electric power generation from nuclear fission are considered. The situation in the United Kingdom, particularly as regards the expansion of nuclear power to the end of the century is reviewed. The policy in the U.K. concerning the disposal of radioactive waste is stated and the system of control used to achieve the objectives of this policy (based on the international standards for safe exposure to members of the public) is described. Artificial radionuclide behavioral data, on which systems of control are initially based, are reviewed and the current radiological status of freshwater and estuarine disposal areas of the United Kingdom is presented. (Ensign-PAI)
W73-09893

SEDIMENTARY PHOSPHORUS IN THE PAMLICO ESTUARY OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
J. B. Upchurch.
Sea Grant Publication UNC-SG-72-03, May 1972. 39 p, 12 fig, 1 tab, 29ref, 2 append.

Descriptors: *Estuaries, *Sediments, *Phosphorus, Freshwater, *Salinity, Separation techniques, Iron, Manganese, Silt, Clay, *North Carolina.
Identifiers: Ferric oxides, *Pamlico estuary (N.C.).

Observations along the 30 mile length of the Pamlico Estuary on the amount of 'available' phosphorus extracted from sediment samples indicated a decrease from 1.6 mg P/gm sediment in fresh water to 0.3 mg P/gm sediment in water with a salinity of 18 ppt. A modification of the HCl-H2SO4 (pH 1.1) acid extraction procedure measured the available phosphorus. A high degree of correlation (r±0.99) between oxalate-extractable iron and available phosphorus was found in the upper reach of the estuary (salinity less than 1 ppt). The Fe-P correlation decreased (r±0.86) in the lower part of the estuary. The decrease in the available P and in the Fe-P correlation along the length of the estuary are consistent with the theory that P is held to suspended sediments by some type of Fe-inorganic P complex of limited stability. The amount of phosphorus would decrease when sediments entering the estuary in the freshwater inflow were transported through the more saline waters to the estuary mouth. (Ensign-PAI)
W73-09897

STUDIES ON THE COASTAL OCEANOGRAPHY IN THE VICINITY OF FUKUYAMA, HIROSHIMA PREF., I. DISTRIBUTION PATTERNS OF TEMPERATURE, CHLORINITY, PH AND INORGANIC NUTRIENT (PHOSPHATE-P, AMMONIA-N, NITRITE-N, NITRATE-N) CONTENTS OF SEA WATER IN EARLY FEBRUARY, 1968, (IN JAPANESE),
Hiroshima Univ. (Japan). Dept. of Fisheries.
H. Koyama, and H. Ochiai.
Journal of the Faculty of Fisheries and Animal Husbandry, Hiroshima University, Vol 11, No 1 p 65-77, July 1972. 8 fig, 3 tab. English summary.

Descriptors: Estuaries, *Coasts, Oceanography, Pollutants, Water temperature, *Chlorinity, Hydrogen ion concentration, *Phosphates, *Ammonia, Nitrites, *Nitrates, Chemical industry, Waste water (Pollution), Outlets, Circulation, Cooling, Nutrients, Water pollution sources.
Identifiers: *Japan, *Ashida River estuary.

Measurements were taken of water temperature, chlorinity, pH and phosphate-P, ammonia-N, nitrite-N and nitrate-N contents of seawater off the estuary of the Ashida River, at 14 stations at both high and low water in February, 1968. The water temperature was within a range of 6-8 deg, its vertical variation was very slight reflecting the vertical circulation of water due to convective cooling. Chlorinity also demonstrated a slight vertical variation due to the same cause everywhere except near the river mouth and an outfall from a chemical plant. Normal pH values were encountered everywhere except in the vicinity of the chemical plant where values as low as 2.4-8.0 pH were measured. Nutrient content in seawater was low but was somewhat higher near the Ashida River estuary, and abnormally high in water samples near waste water outlets from the chemical plant. (Ensign-PAI)
W73-09899

SEWAGE DISPOSAL IN THE TURKISH STRAITS,
Woodward-Envicon, Inc., San Diego, Calif.
C. G. Gunnerson, E. Sungur, E. Bilal, and E. Ozturgut.
Water Research, Vol 6, p 763-774, 1972. 4 fig, 1 tab, 14 ref.

Descriptors: *Waste disposal, *Sewage, *Oceanography, *Circulation, *Currents (Water), *Mixing, Anaerobic conditions, Sanitary engineering, Public health, Coliforms, Bacteria, Outlets, Design criteria, Treatment, Construction.
Identifiers: *Turkish Straits, Mediterranean Sea, Aegean Sea, Dardanelles, Sea of Marmara, Bosporus Sea, Black Sea.

The Turkish Straits extend approximately 300 km from the Aegean Sea through the Dardanelles, Sea of Marmara, and Bosporus to the Black Sea. There is a stable two layer current system where the Mediterranean's heavier highly saline water seeks its own level and flows north to the anaerobic lower portion of the Black Sea. The brackish surface waters carrying river runoff from the Black Sea flows southward. Due to the circulation patterns of these straits it is possible for Istanbul and nearby communities to safely discharge, after flotation, sewage into the lower layer where it will mix with Mediterranean waters flowing into the anaerobic lower portion of the Black Sea. The oceanography of the area is described in detail along with the sanitary engineering factors such as waste characteristics, public health, and coliform bacteria persistence. Functional design criteria

such as depth of discharge, outfall and treatment requirements, vertical flux of sewage, suburban locations and construction priorities are considered. (Ensign-PAI)
W73-09904

MARINE POLLUTION,
For primary bibliographic entry see Field 05G.
W73-09905

NATURAL AND MANMADE HYDROCARBONS IN THE OCEANS,
Texas Univ., Port Aransas. Marine Science Inst.
K. Winters, and P. L. Parker.
1972, 25 P. 5 FIG, 11 TAB, NO REF.

Descriptors: *Organic compounds, Oceans, Aquatic life, Oil, *Oil pollution, *Gulf of Mexico, *Laboratory tests, Bioindicators, Plankton, Sampling.
Identifiers: *Petroleum paraffins.

The abundance of various paraffins in marine materials was measured in order to establish base line data concerning the presence of petroleum derived organic matter in the Gulf of Mexico and other selected locations. The samples were solvent extracted for 12 hours using freshly distilled hexane in a continuous extractor. Laboratory testing yielded the following results: (1) normal paraffin concentrations are higher in waters over the shelf than in open ocean waters, (2) plankton are useful petroleum pollution indicators, and (3) higher organisms from the open sea do not appear to be highly polluted with petroleum. It is also noted that the experimental method used has a direct influence on the data obtained. The problem of transporting samples is a serious one and must be overcome before extensive petroleum pollution research can be undertaken. (Ensign-PAI)
W73-09907

FURTHER INVESTIGATIONS OF THE TRANSFER OF BOMB 14C TO MAN,
Scottish Research Reactor Centre, Glasgow (Scotland). Radiocarbon Unit.
D. D. Harkness, and A. Walton.
Nature, Vol 240, p 302-303, December 1, 1972. 2 fig, 2 tab, 20 ref.

Descriptors: *Carbon radioisotopes, *Atmosphere, *Diet, *Food chains, *Human pathology, Transfer, Absorption, Tracers, Kinetics, Air pollution.
Identifiers: *Bomb 14C, Residence time.

Concentration of 'bomb 14C' reported for human tissues have differed slightly from atmospheric 14C variations. Two factors have been considered as the major contributors to this damping effect: the selective composition of the human diet and the finite residence time for carbon in human tissues. The mean dietary intake of 14C by the population of the United Kingdom is evaluated and the possible application of temporal changes in 'bomb 14C' concentrations as a kinetic tracer for human metabolic processes is assessed. (Ensign-PAI)
W73-09908

WASTE DISPOSAL AND WATER QUALITY IN THE ESTUARIES OF NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. Civil Engineering.
C. D. Riley.
School of Engineering, Summer Project CE 598, Summer 1972. 68p, 1 append.

Descriptors: *Estuaries, *Water quality, *Waste disposal, *Water pollution sources, *Water quality control, Municipal wastes, Urban runoff, Agricultural runoff, Industrial wastes, Water utilization, Hydrology, *North Carolina.

An investigation into waste disposal and pollution in the marine waters of North Carolina is reported. The purpose is to obtain a feeling for the scope and magnitude of the pollution problem of these areas. Inventories of municipal and industrial waste discharges are developed. Pollution associated with diffuse sources such as marine traffic, agricultural runoff, and urban runoff is investigated. The magnitude of the solid waste and air pollution problem is discussed. A series of maps indicate the 'best use' of these waters as established by the North Carolina Department of Water and Air Resources. Restricted shellfish areas as determined by the North Carolina Department of Public Health are also indicated. The general hydrological regime of the geographic area of concern is discussed. (Ensign-PAI)
W73-09911

REVIEW ON THE STATE OF MARINE POLLUTION IN THE MEDITERRANEAN SEA.
Rome, February 1972. 47 p, 78 ref.

Descriptors: *Reviews, Water pollution sources, *Transportation, *Sewage, *Industrial wastes, Oil, *Domestic wastes, Pesticides, Radioactive wastes, Thermal pollution, Plastics, Polychlorinated biphenyls, Suspended load, Water pollution effects, Water quality control, Regulation, International law.
Identifiers: *Mediterranean Sea.

The study on the state of pollution in the Mediterranean Sea covers the following subjects: domestic sewage, industrial pollution, oil pollution, pesticides and other types of pollution. The data were collected sending a questionnaire to all countries bordering the Mediterranean. The following conclusions are presented: all the main urban centers still discharge waste water directly into the sea. The level of organic load by industrial waste and the impact of toxic substances on the water in the eastern part of the Mediterranean are not yet dangerous. The eastern Mediterranean is mainly a region of oil production, and there are only a few big and well defined industrial centers contributing to the contamination by oil. In the western region the main sources of oil pollution are the industrial oil processing enterprises and the trans-shipment of their product. Pollution by pesticides was a local problem, the adverse effects have been found primarily in coastal zones. Radioactive substances, thermal pollution, plastics, suspended matter and polychlorinated biphenyls have not yet seriously affected the water quality in the Mediterranean. The second part of the report is a review of the regulations of Mediterranean countries governing pollution of fresh water resources and the seas. (Ensign-PAI)
W73-09913

A GUIDE TO MARINE POLLUTION.
For primary bibliographic entry see Field 05A.
W73-09915

HALOGENATED HYDROCARBONS,
Canadian Wildlife Service, Ottawa (Ontario).
For primary bibliographic entry see Field 05A.
W73-09916

SUSPENDED SOLIDS AND TURBIDITY,
Copenhagen Univ. (Denmark). Inst. of Physical Oceanography.
For primary bibliographic entry see Field 05A.
W73-09921

RADIOACTIVITY,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05A.
W73-09922

A SYSTEM FOR REMOTE TELEMETRY OF WATER QUALITY DATA,
Maine Univ., Orono. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 07B.
W73-09946

THE APPLICATION OF THE TRANSPORT EQUATIONS TO A GROUNDWATER SYSTEM,
Geological Survey, Denver, Colo.
J. D. Bredehoeft, and G. F. Pinder.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada K1A OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrology; Montreal, Canada, 1972: International Geological Congress Publication, p 255-263, 1972. 5 fig, 7 ref.

Descriptors: *Groundwater movement, *Path of pollutants, *Numerical analysis, Equations, Mathematical models, Model studies, Hydrogeology, Mixing, Water chemistry, Mass transfer, Ion transport, *Georgia.
Identifiers: *Brunswick (Ga).

Predicting changes in groundwater quality in a complex hydrologic system generally requires simulation of the field problem through the use of a deterministic model. In the most general case, a complete physical-chemical description of moving groundwater requires the simultaneous solution of the differential equations that describe the transport of mass, momentum, and energy. The difficulties in solving this set of equations requires simplified subsets of equations. The equation of motion for single-component groundwater flow was solved for many different initial and boundary conditions. To describe the transport of miscible fluids of differing density, the mass-transport equation and the equation of motion were coupled and solved numerically. Numerical solutions were also obtained for the heat transport equation and the equation of motion, particularly for convection problems. A case history of groundwater contamination at Brunswick, Georgia, illustrates the use of the mass- and momentum-transport equations in predicting movement of contaminants. (Knapp-USGS)
W73-09968

SOURCE DETERMINATION OF MINERALIZATION IN QUATERNARY AQUIFERS OF WEST--CENTRAL KANSAS,
Kansas State Dept. of Health, Dodge City.
W. R. Bryson.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada K1A OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 264-269, 1972. 4 ref.

Descriptors: *Path of pollutants, *Groundwater movement, *Hydrogeology, *Kansas, Aquifer characteristics, Malenclaves, Saline water intrusion, Water pollution sources, Brines.

The unconsolidated Quaternary aquifers of west-central Kansas have problems in areas where mineralized waters adversely affect the natural chemical quality. Basic geologic data such as (1) slope and paleotopography of the underlying bedrock surface, (2) permeability changes within the aquifer and (3) the lithology and hydrostatic pressures imposed by the underlying rock are more useful in pinpointing sources of mineralized water than are ratio comparisons of various inorganic constituents. Chemical analyses of water samples collected at bedrock depth from test holes, and at prescribed intervals above the basal collection depth, reveal trends by which areas of mineralized solutions can be outlined. These same test-hole data can be useful in determining the point at which the mineralization is entering the

aquifer and its subsequent path of movement. In an unconsolidated, unconfined aquifer, inorganic solutions move from their point or zone of entrance into the aquifer along predictable flow patterns which can be recognized without exhaustive laboratory analysis of waters for trace elements. (Knapp-USGS)
W73-09969

VARIATIONS OF GROUNDWATER CHEMISTRY BY ANTHROPOGENIC FACTORS IN NORTHWEST GERMANY,
Niedersaechsisches Landesamt fuer Bodenforschung, Hanover (West Germany).
E. Groba, and J. Hahn.
Proc available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 270-281, 1972. 5 fig, 1 tab, 4 ref.

Descriptors: *Groundwater, *Water pollution sources, Farm wastes, *Fertilizers, *Nitrates, Aquifers, Water quality, Water chemistry.
Identifiers: *Germany.

Pollution of water in highly developed and densely populated countries is not restricted to surface waters; the shallow groundwater, too, is affected on a large scale. Large-scale areal pollution of groundwater is restricted to regions built up of permeable, nonindurated sediments without covering layers, thus forming a shallow aquifer. In northern Germany, where such conditions predominate, the most important factor of areal groundwater pollution is the agricultural use of soils especially the application of artificial fertilizers. Near Hannover, the thickness of the uncovered sandy aquifer overlying Cretaceous clays and boulder clay amounts to 20 to 30 m. Intensive agriculture leads to a decrease in pH and bicarbonate, and to an increase of all dissolved salts in the groundwater. Most important, in view of human consumption, is the regional occurrence of nitrate accumulations in the groundwater. The nitrate concentrations in groundwater indicate the intensity of agricultural use of a region. In forest areas it generally amounts to less than 2.5 mg NO3 per liter. Groundwater of smaller units of arable land on the average contains 24 mg per liter; groundwater below large areas of intensively cropped land contains 100 mg per liter. These concentrations, which show an increasing trend, considerable exceed the corresponding values of surface water of the area investigated. (Knapp-USGS)
W73-09970

HYDROGEOLOGIC CRITERIA FOR THE SELF-PURIFICATION OF POLLUTED GROUNDWATER,
Hessiches Landesamt fuer Bodenforschung, Wiesbaden (West Germany).
G. Matthess.
Available from 24th Int. Geological Congress, 601 Booth St., Ottawa, Canada KIA OE8. Price $7.00. In: Proceedings of the 24th Session of the International Geological Congress, Section 11, Hydrogeology; Montreal, Canada, 1972: International Geological Congress Publication, p 296-304, 1972. 2 fig, 1 tab, 14 ref.

Descriptors: *Self-purification, *Groundwater, Path of pollutants, Biodegradation, Adsorption, Oxidation, Chemical precipitation, Hydrogeology, Groundwater movement, Water quality, Waste dumps.

Groundwater polluted by inorganic and organic substances is usually purified by natural processes which are influenced by the geologic conditions. Purification of groundwater pollution caused by waste dumps is due to biochemical decomposition of organic matter by microorganisms, by chemical precipitation and coprecipitation, by sorption on soil particles, on bacterial slimes, and on hydroxides of iron and manganese, by exchange of gases, and by dilution. Sorptive bacterial slimes develop at the surface of the solid particles of aquifers in the polluted zones rich in nutrients. Hydroxides of iron and manganese are typically precipitated in the oxidation zone downstream from polluted areas. (Knapp-USGS)
W73-09971

CHARACTERISTICS OF DISTRIBUTION OF FLUORINE IN WATERS OF THE STEPPE REGIONS OF KAZAKHSTAN IN RELATION TO ENDEMIC FLUOROSIS, (IN RUSSIAN),
T. M. Belyakova, and G. S. Dzyadevich.
Vestn Mosk Univ Geogr. 6, p 79-85. 1971.
Identifiers: Dental caries, *Fluorine distribution, Fluorosis (Endemic), *Kazakhstan (Steppes), USSR, Minerals.

Fluorine enables fixation of Ca and P in the bone tissue; surplus Fl causes fluorosis; insufficient Fl causes dental caries. Results of geochemical studies in Pavlodar and Karaganda Regions, USSR clarify migration and accumulation of Fl. Mean Fl level was 1.5-2.5 mg/l in drinking water. There was no correlation between the degree of mineralization and Fl content. Fl concentration in ocean waters reached 8 mg/l. There was a close relation between the content of chemical elements in underground and surface water and the geological structure of the region.--Copyright 1973, Biological Abstracts, Inc.
W73-09990

POLLUTION PROBLEMS IN RELATION TO THE THAMES BARRIER,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 08A.
W73-09998

THE PATHWAYS OF PHOSPHORUS IN LAKE WATER,
Wyzsza Szkola Rolnicza, Wroclaw (Poland).
J. B. Golachowska.
Pol Arch Hydrobiol, Vol 18, No 4, p 325-345, 1971, Illus.
Identifiers: Algae, Bacteria, Lakes, *Phosphorus, Water pollution sources, *Path of pollutants.

The circulation of P in lakes presented shows that the production ability of a water body is determined not only by the absolute level of P content but also the form in which it occurs. In lakes of different types total P in the summer period consists of 40-60% dissolved orthophosphates, 16-33% dissolved organic P, 3-20% particulate organic P and 4.2-11.7% particulate mineral P. These 4 forms have a basic significance for the interpretation of biological processes. Attention is given to the fact that in some lakes in the summer a significant position in total P balance is played by dissolved organic P. It is supposed that the sources of this form are algae and bacteria. It is shown that humus compounds, Fe and C strongly influence the phytoplankton production. These compounds may act either as inhibitors or stimulators. Significance loss of P from lake water in the autumn was caused by sorption by bottom deposits of the 'mineral' type. Deposits of 'organic' type show very weak sorption and, therefore, in some conditions they release phosphates to the water.--Copyright 1972, Biological Abstracts, Inc.
W73-10004

THE DISTRIBUTION OF CHITIN- AND N--ACETYLGLUCOSA-MINE-DECOMPOSING BACTERIA IN AQUATIC ENVIRONMENTS,
Kagawa Univ., Takamatsu (Japan). Dept. of Food Science.
K. Okutani, and H. Kitada.
Kagawa Daigaku Nogakubu Gakuzyutu Hokoku, Vol 23, No 1, p 127-136, 1971, Illus.
Identifiers: *Bacteria, Decomposition (Bacteria), Distribution, Aquatic environments.

Investigations of chitin- and N-acetylglucosamine (NGA)-decomposing systems by bacteria in aquatic environments which may be the first step of ammonia splitting systems from chitin were carried out. The chitin-decomposing bacteria were distributed in sea water and the bottom muds at 10 cells/ml and 1000-10,000 cells/gm of wet muds at coastal regions. In freshwater environments, the chitin-decomposing bacteria were distributed at 1000-10,000 cells/g of wet muds and 10 cells/ml of water. The population of chitin-decomposing bacteria was much smaller than that of the heterotrophic bacteria. The NGA-decomposing bacteria were detected in sea water at 100-1000 cells/ml and 10,000-100,000 cells in the bottom muds at coastal regions. At the open-sea, 0-1000 cells/100 ml of the NGA-decomposing bacteria were detected in sea water and 1000 cells/g of the bottom muds. NGA-decomposing bacteria were distributed in freshwater environments at 10 cells/ml of water.--Copyright 1972, Biological Abstracts, Inc.
W73-10010

THE ENVIRONMENTAL MATRIX: INPUT-OUTPUT TECHNIQUES APPLIED TO POLLUTION PROBLEMS IN ONTARIO,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 05G.
W73-10020

INJECTION WELLS AND OPERATIONS TODAY,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
E. C. Donaldson.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 24-46, 1972. 11 fig, 8 tab, 21 ref, 1 append.

Descriptors: *Waste disposal wells, *Injection wells, *Underground waste disposal, Water chemistry, Kinetics, Dispersion, Water pollution effects, Water pollution sources.

The feasibility and limitations of the underground injection of industrial wastes were studied by observing installations at industrial plants, cities, and oil fields. The chemical industry is using about 175 deep wells to inject approximately 30 million gal per day of waste solutions. The wastes are inorganic salts, mineral and organic acids, basic solutions, chlorinated and oxygenated hydrocarbons, and municipal sewage. The wells, ranging from 300-2, 440 m deep, are completed in three general types of formations: unconsolidated sand, consolidated sandstone, and vugular carbonate rock. The chemical and physical characteristics of the formation and waste dictate the design of the injection system and govern its operation. Commonly, underground injection is the most economical method for disposal of liquid wastes not amenable to surface treatment. Operating costs are lower for pretreatment and subsurface disposal than for surface treatment systems, and plant area requirements are less. Chemical treatment is minimal, and generally the only physical treatment required for underground injection is filtration. (Knapp-USGS)
W73-10023

RESPONSE OF HYDROLOGIC SYSTEMS TO WASTE STORAGE,
Geological Survey, Washington, D.C. Water Resources Div.
J. G. Ferris.

In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 126-132, 1972. 1 ref.

Descriptors: *Underground waste disposal, *Waste disposal wells, *Path of pollutants, *Water pollution effects, Hydrogeology, Aquifer characteristics, Groundwater movement, Groundwater basins.

The demand for cleanup of lakes and streams is literally driving pollution underground. The use of sanitary landfills for disposal of solid wastes, the use of spray irrigation for disposal of partly treated sewage effluent, and the use of deep-well injection for disposal of certain industrial wastes are increasing rapidly. Aquifers are dynamic flow systems that undergo change whenever a new stress is imposed. Attendant upon the injection of fluid into an aquifer is increase in hydraulic head which ultimately influences the hydrologic regime throughout the entire flow system. Disposal to shallow aquifers, which are generally sources of water supply, poses a threat not only to present and future well developments but also to lakes and streams that are sustained by groundwater seepage. In deep-lying confined aquifers, the hydraulic transmissivity is generally small; consequently, the pressures required for significant rates of injection are large. In marked contrast to the very slow migration of the waste, pressure is propagated outward very rapidly. Thus, evaluation of the consequences of waste injection requires not only consideration of the effects of the advancing waste but also the far-reaching effects of the pressure increase. (Knapp-USGS)
W73-10025

APPLICATION OF TRANSPORT EQUATIONS TO GROUNDWATER SYSTEMS,
Geological Survey, Denver, Colo.
J. D. Bredehoeft, and G. F. Pinder.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 191-201, 1972. 6 fig, 17 ref.

Descriptors: *Groundwater movement, *Path of pollutants, *Numerical analysis, Equations, Mathematical models, Model studies, Hydrogeology, Mixing, Water chemistry, Mass transfer, Ion transport.
Identifiers: Brunswick (Ga).

Predicting changes in groundwater quality in a complex hydrologic system generally requires simulation of the field problem through the use of a deterministic model. In the most general cases a complete physical-chemical description of moving groundwater requires the simultaneous solution of the differential equations that describe the transport of mass, momentum, and energy. The difficulties in solving this set of equations requires simplified subsets of equations. The equation of motion for single-component groundwater flow has been solved for many different initial and boundary conditions. To describe the transport of miscible fluids of differing density, the mass-transport equation, and the equation of motion have been coupled and solved numerically. Numerical solutions have also been obtained for the heat transport equation and the equation of motion, particularly for convection problems. A case history of groundwater contamination at Brunswick, Georgia, illustrates the use of the mass- and momentum-transport equations in predicting movement of contaminants. (Knapp-USGS)
W73-10027

CIRCULATION PATTERNS OF SALINE GROUNDWATER AFFECTED BY GEOTHERMAL HEATING--AS RELATED TO WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
H. R. Henry, and F. A. Kohout.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 202-221, 1972. 26 fig, 43 ref.

Descriptors: *Groundwater movement, *Path of pollutants, *Waste disposal wells, *Hydrogeology, *Convection, Florida, Water circulation, Hydraulic models, Numerical analysis, Equations, Underground waste disposal, Geothermal studies.

The fate of the waste liquids entrained in saline aquifer systems depends upon the state of motion in the aquifer before injection and the modification of this state by the injection process. The Floridan aquifer underlying peninsular Florida is more than 2,000 ft thick and provides a field situation for comparison with mathematical and hydraulic models. The aquifer is exposed to cold seawater where truncated by the deep trenches of the Gulf of Mexico and the Florida Strait. Natural upwellings of warm saline water and observations of temperature and salinity in wells suggest that the seawater flows inland at depth then upward into shallow parts of the aquifer, and, after mixing with freshwater it flows seaward again to form a large, geothermally heated, convective flow cycle. A hydraulic sand model was built to simulate a saline aquifer, a geothermal source, freshwater recharge, and waste-injection wells. The hydraulic-flow equation, the diffusion equation for salt and injected contaminants, and the heat-diffusion equation were solved simultaneously on a high-speed digital computer. Theoretical solutions for the hydraulic model qualitatively correspond to observed distributions of temperature and salinity in the Floridan aquifer. (Knapp-USGS)
W73-10028

HYDRODYNAMICS OF FLUID INJECTION,
California Univ., Berkeley.
P. A. Witherspoon, and S. P. Neuman.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 258-272, 1972. 11 fig, 19 ref, 1 append.

Descriptors: *Injection wells, *Artesian aquifers, *Hydrogeology, *Waste disposal wells, Equations, *Path of pollutants, Hydrodynamics, Groundwater movement, Fractures (Geologic), Porosity, Permeability, Stratigraphy, Anisotropy, *Leakage, Injection, Confined water.

A theory for the flow of slightly compressible fluids in multilayered porous systems predicts the effects of injecting into a permeable layer and also the consequent effects in adjacent confining beds. Pressure buildup in a multilayered system depends on the degree of communication that develops within the system between aquifer and aquitard. This communication can be characterized in terms of the permeabilities, storage coefficients, and bed thicknesses. By considering multilayered systems under quasi-steady state conditions, a conservative method of evaluating leakage through an aquitard can be made. (Knapp-USGS)
W73-10032

WATER-MINERAL REACTIONS RELATED TO POTENTIAL FLUID-INJECTION PROBLEMS,
Geological Survey, Menlo Park, Calif. Water Resources Div.
I. Barnes.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 294-297, 1972. 3 tab, 5 ref.

Descriptors: *Waste disposal wells, *Water chemistry, *Mineralogy, *Water pollution effects, *Chemical reactions, Injection wells, Thermodynamics, Water quality, Carbonates, Silicates, Clay minerals, Geochemistry, Chemical precipitation, Corrosion.
Identifiers: *Water compatibility (Injection).

Reinjection of formation waters creates few chemical problems if no large change in temperature has occurred, no gas or vapor has separated, and access of air has been prevented. The fluids already have had an opportunity to react with the minerals to the point of compatibility. Injection of incompatible fluids, however, may cause chemical problems; thus, prediction of fluid-mineral reactions should be attempted. Reactions should be studied in both reaction directions. All the species in a solution generated by complete solution of the solid must be considered. Using incongruent reactions (reactions producing a new solid directly from the reactant solid) introduces the unwarranted assumption of equilibrium. In general, hydroxide species such as amorphous silica, limonite, and brucite, as well as simple carbonates, have been found to dissolve or precipitate in natural systems. More complex silicates including serpentine, kenyaite, and magadiite may not precipitate from solutions. Sulfides such as covellite, chalcocite, and pyrite may not precipitate even where supersaturation exceeds 30 kcal, although some sulfide minerals will dissolve readily where oxidation of sulfur can take place. (Knapp-USGS)
W73-10034

NATURAL-MEMBRANE PHENOMENA AND SUBSURFACE WASTE EMPLACEMENT,
Geological Survey, Washington, D.C.
B. B. Hanshaw.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 308-317, 1972. 6 fig, 23 ref.

Descriptors: *Waste disposal wells, *Injection, *Aquitards, *Membrane processes, *Clay minerals, Shales, Osmosis, Clays, Reverse osmosis, Adsorption, Semipermeable membranes, Water pollution effects, Path of pollutants, Injection wells, Ion exchange.

In any plan to emplace liquid waste in an aquifer system, the membrane behavior of shale must be taken into account. Clay minerals are natural semipermeable membranes capable of retarding the passage of charged species through its micropores. If a chemical, electrical, or thermal gradient is imposed across a semipermeable membrane, the result is a movement of water tending to equalize the chemical potential of water on the two sides of the membrane. If liquid wastes are injected into an aquifer system, the emplacement will likely upset the dynamic equilibrium; it may cause (1) chemical reactions with the existing fluid and rocks, (2) thermal changes, and (3) increased pressure on the aqueous phase. If a shale capable of behaving as a membrane is an aquitard, its membrane characteristics must be taken into account. An osmotic cell may be set up between a nearby aquifer and the emplacement aquifer with the intervening shale acting as a membrane. A pressure increase beyond that anticipated could occur across the shale membrane. If it exceeds the pressure required for osmotic balance, ultrafiltration can result. The effect would be to cause flow across the shale and increase the chemical concentration of the filtrate in the aquifer beyond the planned account. (Knapp-USGS)
W73-10035

GEOCHEMICAL EFFECTS AND MOVEMENT OF INJECTED INDUSTRIAL WASTE IN A LIMESTONE AQUIFER,
Geological Survey, Tallahassee, Fla.
D. A. Goolsby.
In: Underground Waste Management and Environmental Implications, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 355-368, 1972. 14 fig, 4 tab, 11 ref.

Descriptors: *Water pollution effects, *Path of pollutants, *Limestones, *Waste disposal wells, *Florida, Neutralization, Denitrification, Aqueous solutions, Salinity, Nitrates, Organic compounds, Salts, Industrial wastes, Hydrogeology.
Identifiers: *Pensacola (Fla).

Since 1963, more than 6 billion gallons of acidic industrial waste have been injected into a limestone aquifer near Pensacola, Florida. The industrial waste is an aqueous solution containing nitric acid, inorganic salts, and numerous organic compounds. Industrial waste is injected at a rate of about 2,100 gal per minute. Wellhead injection pressures are about 175 psi. Pressure effects in the receiving aquifer extend out more than 30 mi. No change in pressure has been detected in the aquifer directly above the clay confining layer. Geochemical effects were detected at a monitor well in the receiving aquifer 0.25 mi from the injection wells about 10 months after injection began. The geochemical effects included increases in calcium-ion concentration and total alkalinity and formation of large quantities of nitrogen and methane gas. Geochemical effects have not been detected 1.9 mi north and 1.5 mi south of the injection wells, nor have effects been detected in a monitor well at the injection site open to the aquifer directly overlying the clay confining layer. Denitrification may have accounted for more than half the neutralization, and solution of calcium carbonate accounted for the rest. (Knapp-USGS)
W73-10036

TRACER RELATIONS IN MIXED LAKES IN NON-STEADY STATE,
Weizmann Inst. of Science, Rehovot (Israel). Isotope Dept.
For primary bibliographic entry see Field 02H.
W73-10059

MODIFICATIONS IN THE SOLUBILITY AND PRECIPITATION BEHAVIOR OF VARIOUS METALS AS A RESULT OF THEIR INTERACTION WITH SEDIMENTARY HUMIC ACID,
Bedford Inst. of Oceanography, Dartmouth (Nova Scotia). Atlantic Geoscience Center.
For primary bibliographic entry see Field 02K.
W73-10062

PROVENANCE AND ACCUMULATION RATES OF OPALINE SILICA, AL, TI, FE, CU, MN, NI, AND CO IN PACIFIC PELAGIC SEDIMENTS,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
For primary bibliographic entry see Field 02J.
W73-10063

NITROGEN IN NATURE AND SOIL FERTILITY, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Mikrobiologii.
For primary bibliographic entry see Field 02G.
W73-10068

WATER QUALITY OF COLORADO RIVER (PROVINCE BUENOS AIRES) USED IN IRRIGATION, (IN SPANISH),
Universidad Nacional del Sur, Bahia Blanca (Argentina).
J. C. Lucero, and H. L. Concetti.
Inst Nac Tecnol Agropecu Suelos Publ. 122, p 57-69. 1971. Illus. English summary.
Identifiers: Adsorption, *Buenos-Aires, Calcium, Chemical analysis, Conductivity (Electrical), *Irrigation water, Rivers, Salinity, Sodium, Water quality, Hydrogen ion concentration.

A study was made of the quality of irrigation water of 'rio Colorado' (Lower valley in Buenos Aires). Five places were selected for sampling. The samples were taken at the beginning and middle of each month, between Nov. 1967 and April 1968. Determined were: electrical conductivity, pH, Ca, Mg, Na, K, bicarbonate, sulfate, chloride, dissolved solids, B and Na-adsorption-ratio (S.A.R.). The results show high and medium salinity hazard with low Na (alkali) hazard. The B concentrations permits normal growth of sensitive and semitolerant crops. Bicarbonate ion concentration is safe for irrigation water. Variations were observed in different dates in the same place and there was a ratio between the values in the same place and other observation points.--Copyright 1973, Biological Abstracts, Inc.
W73-10089

CHEMICAL POLLUTION AND MARINE TROPHODYNAMIC CHAINS, (POLLUTIONS CHIMIQUES ET CHAINES TROPHODYNAMIQUES MARINES),
Centre d'Etude et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 05C.
W73-10091

UTILIZATION OF A TROPHODYNAMIC CHAIN OF A PELAGIC TYPE FOR THE STUDY OF TRANSFER OF METALLIC POLLUTION, (UTILISATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE PELAGIQUE POUR L'ETUDE DES POLLUTIONS METALLIQUES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 05C.
W73-10092

STUDY OF THE TOXICITY OF EFFLUENTS FROM PAPER MILLS IN THE MARINE ENVIRONMENT, (ETUDE DE LA TOXICITE D'EFFLUENTS DE PAPETERIE EN MILIEU MARIN),
Centre d'Etude et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 05C.
W73-10093

MERCURY CONTAMINATION OF FISH OF THE SEA, (CONTAMINATION DES POISSONS DE MER PAR LE MERCURE),
G. Cumont, G. Viallex, H. Lelievre, and P. Bobenrieth.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 95-127, 1972. 1 tab, 7 histograms, 6 graphs, 8 ref.

Descriptors: *Mercury, *Fish, Water pollution sources, *Toxicity, *Water quality standards, Food chain.
Identifiers: *Concentration levels.

Mercury determination in the muscle of various species of fish is researched. Results showed concentrations of this metal generally to be below the norms admissable for today's standards. The accumulation of mercury is always proportional to the weight of the fish. Consequently, the larger individuals at the end of the food chain are apt to have concentrations higher than these norms. Fish from certain areas showed abnormally high levels indicating a higher rate of mercury pollution in those specific areas. (Ensign-PAI)
W73-10094

THE MARINE ENVIRONMENT AND ORGANIC MATTER, (LE MILIEU MARIN ET LES MATIERES ORGANIQUES),
Centre d'Etude et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 05C.
W73-10097

COASTAL ZONE POLLUTION MANAGEMENT, PROCEEDINGS OF THE SYMPOSIUM.
For primary bibliographic entry see Field 05G.
W73-10098

WE ARE KILLING THE OCEANS,
Senate, Washington, D.C.
E. F. Hollings.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina. February 21-22, 1972. Clemson University, Clemson, S.C. 1972. p 1-9.

Descriptors: *Coasts, Water pollution control, Sewage, *Domestic wastes, *Industrial wastes, *Agricultural runoff, *Radioactive wastes, *Oil, Mixing, Natural resources, Fish, *Legislation, Government supports, Programs.

The global aspects of coastal and ocean pollution are reviewed, and instances of pollution from domestic sewage, agricultural runoff, industrial and radioactive wastes, oil, and undersea mining and exploration are reported. Depletion of fish populations and other ocean resources is discussed and legislation and government programs to protect the coastal zone are considered. (See also W73-10098) (Ensign-PAI)
W73-10099

REGIONAL COASTAL POLLUTION CONTROL,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 05G.
W73-10101

INVOLVEMENT OF NOAA IN COASTAL POLLUTION MANAGEMENT,
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Ecology and Environmental Conservation.
For primary bibliographic entry see Field 05G.
W73-10104

ESTUARINE SURVEYS IN THE SOUTHEAST,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
J. E. Hagan, III.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 155-174.

Descriptors: *Estuaries, *Coasts, Water pollution, *Ecosystems, *Analytical techniques, Pollutants, *Water quality, Odor, Electric powerplants, Fish-kill, Bacteria, Pulp wastes, Waste disposal, Fisheries, Shellfish, Coliforms, Chemicals, Mining, Florida, Georgia, South Carolina, Alabama, *Southeast US.
Identifiers: Spectral analysis, Dye tracer studies, Brown foam.

This is a review of selected estuarine studies which have been conducted in recent years along the southeastern Atlantic and Gulf Coast, and an attempt to draw some generalization concerning the types of pollution situations encountered, study techniques which have been particularly useful (or not useful), and some of the problems which seem to recur with the greatest frequency. Studies are selected which attempt to deal with fairly large segments of the ecosystem, demonstrate particular techniques, highlight recurring

problems, and were of particular personal interest to the author. The effects of rediversion of the Cooper River on the water quality of Charleston Harbor, South Carolina, are considered. Other topics include: obnoxious odors in Hillsborough Bay, Florida; the influence of a steam-electric generating station on the shores of lower Biscayne Bay, Florida; fish kills in Escambia Bay, Florida; the effect of a paper mill on Perdido Bay, Alabama; bacterial pollution of Mobile Bay Alabama; waste disposal in the Savannah River Estuary, Georgia; water quality in Waccasassa and Fernholloway Estuaries, Florida; pollutant problems in Lake Worth, Florida; the effects of chemical disposal on Port Royal Sound, South Carolina and strip mining in the area of the Georgia coastal marsh. (See also W73-10098) (Ensign-PAI)
W73-10106

OCEANOGRAPHIC SURVEYS FOR DESIGN OF POLLUTION CONTROL FACILITIES,
Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 05E.
W73-10107

APPLICATIONS OF ESTUARINE WATER QUALITY MODELS,
Manhattan Coll., Bronx, N.Y.
D. J. O'Connor, and R. V. Thomann.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 215-226. 5 fig.

Descriptors: *Estuaries, *Water quality, *Mathematical models, Dissolved oxygen, Biochemical oxygen demand, Nitrogen, Delaware River, Continuity equation, Waste water disposal, Waste water treatment.
Identifiers: Time stepping, Finite differences, *Delaware River estuary.

A mathematical model for the concentration of a material in estuarine waters based on the continuity equation is discussed. Various approximative techniques are given for both the stationary and non-stationary cases, these include subdivision of the area of interest in subregions with constant coefficient equations as well as a frequency response analysis on time stepping. The possibility of sources or sinks of material due to effluents and chemical or biochemical oxygen demand for the Delaware Estuary are computed for various conditions of water discharge and waste treatment. The steady state solution is compared with a time response technique and with a segmentation technique. The results compare well. (See also W73-10098) (Ensign-PAI)
W73-10108

SUBMERGED DIFFUSERS IN SHALLOW COASTAL WATERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-10109

COASTAL ZONE POLLUTION MANAGEMENT. A SUMMARY,
Clemson Univ., S.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-10111

NUMERICAL MODEL FOR THE PREDICTION OF TRANSIENT WATER QUALITY IN ESTUARY NETWORKS,
Massachusetts Inst. of Tech., Cambridge.
J. E. Dailey, and D. R. F. Harleman.
Sea Grant Project Office, Report No. MITSG 72-15, October 1972. 226 p, 56 fig, 8 tab, 42 ref, 2 append. DSR 72602, 73479 and 73986. NOAA-GH-88 and 2-35150. EPA-R-800429.

Descriptors: *Estuaries, *Water quality, *Forecasting, *Mathematical models, Model studies, Numerical analysis, *Tides, Salinity, Temperature, Biochemical oxygen demand, Dissolved oxygen, Turbulence, *Dispersion, Waste disposal, Eddies, Diffusion, Mixing, *Path of pollutants.
Identifiers: James River Model, Cork Harbour (Ireland).

A one-dimensional network model that can be applied to geometrically complex estuaries is developed for the prediction of transient estuarine water quality. The time scale of the model is on the order of minutes and is called tidal time and is used to model longitudinal dispersion. Longitudinal dispersion is associated with tidal motion where a constituent is spread out by eddy diffusion and velocity distribution interaction. Salinity, temperature, BOD and DO are the constituents included in the model. The concentration distribution of these constituents are obtained by solving the conservation of mass equations including transport, mixing and reaction processes. The tidal time permits formulation of an ocean boundary condition related to the direction of tidal flow. The numerical solution procedures were based on the method of weighted residuals, an application technique of the finite element method. Computed results were compared with available data from dye test experiments in the James River Model and field data from dye tests in Cork Harbour, Ireland to demonstrate the model's predictive capabilities. (Ensign-PAI)
W73-10112

A PRELIMINARY STUDY OF BACTERIAL POLLUTION AND PHYSIOGRAPHY OF BEIRUT COASTAL WATERS,
American Univ., Beirut (Lebanon). Dept. of Biology.
H. Kouyoumjian.
Revue Internationale d'Oceanographie Medicale, Vol 26, p 5-26, 1972. 5 fig, 2 tab, 28 ref.

Descriptors: *Coasts, Water pollution sources, Sewage effluents, *Sewage bacteria, *Bacteria, Salinity, Hydrogen ion concentration, Temperature, Sewers, *Outlets, Waste dilution, Climatology, Oceanography, Sewage treatment, Reclamation, Waste water treatment.
Identifiers: *Beirut, Republic of Lebanon, *Mediterranean Coast.

Twenty-four sampling stations were fixed with reference to the major sewer outlets and swimming beaches in the highly polluted coastal waters. During a twelve month period in 1969-70, regular seawater samples were taken for general bacteriological studies. Salinity, pH, and temperature were determined for each station. The climatology, oceanography, and sewerage in Lebanon are surveyed and the bacterial quality of Beirut's coastal waters is discussed. The placing of a major sewer for effective bacterial dilution is discussed and the advantages and disadvantages of two possible locations are considered. Sewage reclamation is recommended as a permanent solution to both water pollution and water resources scarcity. (Ensign-PAI)
W73-10119

RESTRUCTURING OF SHORES AND SECONDARY POLLUTION. STUDY OF THE EUTROPHICATION OF HARBOR ZONES. (RESTRUCTURATION DES RIVAGES ET POLLUTIONS SECONDAIRES. ETUDE DE L'EUTROPHISATION DE ZONES PORTUAIRES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 05C.
W73-10120

A SHORT SURVEY OF THE ENVIRONMENT AT THE DUMPING SITE FOR SANTA CRUZ HARBOR DREDGING,
Moss Landing Marine Labs., Calif.
R. E. Arnal.
Technical Publication No. 72-6, August 1972. 20 p, 5 fig, 2 tab, 8 ref. NOAA 2-35137.

Descriptors: *Harbors, *Dredging, *Sediments, Marine plants, Marine animals, On-site investigations, Environmental effects, Water pollution control, *California.
Identifiers: *Santa Cruz (Calif), *Environmental impact survey, *Dumping sites.

A survey of the environment in the Santa Cruz Harbor District was conducted prior to a proposed expansion of the small craft harbor to provide additional, 400 boat berths. Local surface currents, bottom topography, sediments in the dredge site, sediments in the disposal site, and local benthic communities were all investigated. A very high organic content was discovered in the sediments at the dredge site, regardless of particle size; and there was a high biomass value at the disposal site and surrounding area. The best dumping site was determined to be on the 122 deg 00 min west longitude meridian at the intersection with the 5 fathom contour. Dredge spoil was delivered to the dumping site by means of a 3,000 foot floating pipeline. (Ensign-PAI)
W73-10124

THE CHANGING CHEMISTRY OF THE OCEANS,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
D. Dyrssen.
Ambio, Vol 1, No 1, p 21-25, February 1972. 6 fig.

Descriptors: Conferences, *Oceans, *Chemicals, *Aerosols, *Monitoring, *Water pollution, Water pollution control, Foreign countries, Foreign research, Reviews.
Identifiers: *Research reviews.

Some key ideas presented at Nobel Symposium 20 on the 'Changing Chemistry of the Oceans' are recapped. Scientists stress that the natural fluctuations in atmospheric and oceanic variables must be understood before man-induced effects can be accurately ascertained. Some areas of concern such as the increase of carbon dioxide in the atmosphere, marine aerosols, and coastal oil pollution are briefly discussed; the effects of synthetic organics are also reviewed. The restricted use of pollutants such as chlorinated hydrocarbons is advised. Monitoring systems are suggested as a means of guarding threatened ecosystems from distruction by lethal levels of pollutants. It is also recommended that information on the production and use of potential pollutants be made easily available worldwide. (Ensign-PAI)
W73-10125

SOME ADDITIONAL MEASUREMENTS OF PESTICIDES IN THE LOWER ATMOSPHERE OF THE NORTHERN EQUATORIAL ATLANTIC OCEAN,
Rosenstiel School of Marine and Atmospheric Sciences, Miami, Fla.
J. M. Prospero, and D. B. Seba.
Atmospheric Environment, Vol 6, No 5, p 363-364, May 1972. 1 fig, 7 ref. NSF GA-25916, GA-22033.

Descriptors: *Aerosols, *Marine air masses, *Pesticides, *Dusts, Water pollution sources, *Air pollution, *Atlantic Ocean, Air-water interfaces.
Identifiers: Trade winds, West Indies, Pollutant transport.

Marine aerosols collected from the trade winds at Barbados, West Indies during July, 1970, were measured for dust and pesticide levels. The

Saharan dust transport is at a maximum in its annaul cycle during July. The daily concentration of pp' DDT, dieldrin, and dust for this time period is contrasted with measurements taken in November and December. The July measurement showed a dust load one hundred times greater than the winter levels. It is noted, however, that relatively high pesticide concentrations coincide with high dust loads. It is suggested that the dust in the higher Saharan level could serve to scavenge airborne pollutants in the low level air and carry this material into the ocean. A method for calculating a lower limit on the quantity of material transported by the winds through the longitude of Barbados is outlined. (Ensign-PAI)
W73-10128

ESTUARIES AND INDUSTRY,
University of Strathclyde, Garelochhead (Scotland). Marine Lab.
E. J. Perkins.
Environment This Month, Vol 1, No 2, p 47-54, August, 1972. 6 fig, 15 ref.

Descriptors: *Estuaries, Physical properties, *Industrial wastes, *Urbanization, Pollutants, Metals, Water quality standards, History, Water pollution sources.
Identifiers: *Solway Firth, *Great Britain.

The Solway Firth in Great Britain is the country's largest estuary remaining relatively free from pollution. The historical factors which combine to prevent pollution of the estuary, as well as present day efforts to maintain this condition, are reported. Physical alterations of a marine area may have more potent and more long-lasting effects on the environment and biota than chemical additives. A relief of pressure from any chemical except a biodegradable one can produce a foreseeable return to optimal marine conditions. Dumping inert solid material into an estuary, on the otherhand, may produce effects which will take far longer to reverse. The relationship between activities involving the Firth at the start of the Industrial Revolution and current industrial activities is investigated. Natural factors are separated from man-induced effects and each is studied in some detail. (Ensign-PAI)
W73-10133

INFLUENCE OF AEROSOLS IN THE MARINE ENVIRONMENT (INFLUENCE DES AEROSOLS MARINS DANS L'ENVIRONMENT),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
J. Aubert.
Revue Internationale d'Oceanographie Medicale, Vol 26, p 43-52, 1972. 3 tab, 4 ref. English summary.

Descriptors: *Aerosols, *Seawater, Water pollution, Environmental effects, *Chemicals, *Microorganisms, *Dispersion, Particle size, Distance, Time, Transfer, Bacteria, Coliforms, Marine bacteria.
Identifiers: *Nice (France), Terrestrial bacteria.

Aerosols created by the wind as it passes over marine regions may, under certain weather conditions, travel over the adjacent shore. Some microorganisms were observed in situ to be transported over quite long distances. The dispersal mechanics of these aerosols and of their biological charge, in relation to particle size, distance, and exposure duration are explained by in vitro experiments. The mechanisms of the transfer of microorganisms, chemicals and biochemicals were also considered in these experiments. Microbiological studies on marine aerosols were conducted in zones of both strong and weak pollution, depending on the sewage discharge area. Aerosols were captured in various media to show organisms of terrestrial origin, coliforms and specifically marine organisms. (Ensign-PAI)
W73-10136

MARINE POLLUTION, CONCENTRATING ON THE EFFECTS OF HYDROCARBONS IN SEAWATER,
Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
D. P. Hoult.
In: Law of the Sea Workshop, Canadian-U.S. Maritime Problems, June 15-17, 1971, Toronto, Canada, University of Rhode Island, Kingston, Law of the Sea Institute, p 29-31, 1972. LM. Alexander and G. R. S. Hawkins, editors.

Descriptors: *Oceans, Oil pollution, Oil spills, *Surface tension, *Viscosity, *Gravity, *Mathematical models, Analytical techniques, Path of pollutants.
Identifiers: *Oil spill control, Skimmers, Barriers.

The growing concern over oil pollution is discussed. The spread of oil once spilled is the result of four forces, gravity, surface tension, viscous drag and inertia. A mathematical statement representing the spread of oil into a thin film (due to surface tension) is presented. The rate at which oil spreads into a film appears to be independent of the volume of oil originally released. There is not, then, a direct correlation between the amount of oil spilled and the size of the resultant slick. Mathematical analyses are also applied to techniques for controlling oil spills. All mechanical barriers are subject to a restricted usefulness dependent upon the size of the water current. Skimmers are also limited--if the velocity at the orifice used to suck up the oil is too great, either water or oil will be entrained. (Ensign-PAI)
W73-10144

DISPOSAL OF CHINA CLAY WASTE IN THE ENGLISH CHANNEL,
Marine Biological Association of the United Kingdom, Plymouth (England). Lab.
N. A. Holme.
In: Colloque sur la Geologie de la Manche, Symposium, January 14-15, 1971, Paris, France. Memoires, Bureau de Recherches Geologiques et Minieres No 79, 1972, 2 p. 1 ref.

Descriptors: *Industrial wastes, *Waste disposal, Pipelines, *Outfalls, *Dispersion, Water pollution effects.
Identifiers: *Tracer studies, *China clay wastes.

A method for disposing of fine micaceous waste from the china clay industry is outlined. The scheme involves the use of a pipeline which would run overland to a point near the coast, then tunnel to an outfall position about a mile offshore. A number of tests were done to determine the best location of the outfall, based on the waste dispersion pattern. One such study involved the use of radioactive isotopes as tracers. An experimental slurry was prepared, including the tracers, and then discharged off the coast from a temporary pipeline. Most of the slurry settled initially on the sea bed close to the outfall pipe and subsequent monthly surveys indicated that it only slowly dispersed from this area. It is believed that greater quantities of the actual clay residues would behave in a similar fashion. (Ensign-PAI)
W73-10145

A NEW APPROACH TO THE MEASUREMENT OF RATE OF OXIDATION OF CRUDE OIL IN SEAWATER SYSTEMS,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
C. F. Gibbs.
Chemosphere, Vol 1, No 3, p 119-124, May, 1972. 3 fig, 8 ref.

Descriptors: *Oil, Oil spills, *Biodegradation, *Measurement, Marine microorganisms, *Laboratory tests, Nutrients, Pollutant identification, Water pollution sources.
Identifiers: *Decomposition rates, *Winkler analysis.

A more accurate method for measuring the rate of decomposition of oil by microorganisms in a natural marine environment is proposed. This approach involves a semi-closed system with oxygen concentrations measured by Winkler titration on abstracted samples. Kuwait crude oil was used in the experiments, mixed into aged seawater. The results of a series of lab tests indicate that the rate of decomposition of oil by marine organisms is very low in unenriched seawater; levels of nitrogen and/or phosphorous nutrients appear to be important factors in degradation rates. The problem of approximately natural nutrient levels in a laboratory situation remains to be solved. (Ensign-PAI)
W73-10150

BIOENVIRONMENTAL FEATURES: AN OVERVIEW.
National Marine Fisheries Service, Seattle, Wash.
D. L. Alverson.
In: The Columbia River Estuary and Adjacent Ocean Waters, Bioenvironmental Studies (A.T. Pruter and D.L. Alverson, eds.), University of Washington Press, Seattle, Washington 1972. p 845-857, 1 fig, 7 ref.

Descriptors: *Columbia River, *Nuclear wastes, *Radioisotopes, *Radioecology, Environmental effects, Path of pollutants, Model studies, Theoretical analysis, Public health, Waste assimilative capacity, Disperson, Estuarine environment, Effluents, Water pollution, Water pollution effects.

The Columbia flows through the Hanford site, some 375 miles upstream from its mouth. Features of the Columbia and its estuary are described. In all, over 60 radionuclides have been measured in the radioactive effluent at Hanford. The more abundant, longer-half-life radionuclides are reconcentrated by biological systems and can be detected in the river and adjacent ocean system. Some speculative models of diel, seasonal, and annual transport patterns are discussed. Various authors noted that the discharged radionuclides have proved a powerful tool, but they did not attempt to evaluate the decision made 3 decades ago to discharge the cooling effluent. The studies provide a wealth of new information which is of value in enhancing capacity to interpret the likely downstream features of radioactive and other pollutants accidentally or purposely discharged into the river, and the impact on the associated biota. (Bopp-ORNL)
W73-10174

FALLOUT PROGRAM. QUARTERLY SUMMARY REPORT (DEC. 1, 1972 THROUGH MARCH 1, 1973),
New York Operations Office (AEC), N.Y. Health and Safety Lab.
E. P. Hardy, Jr.
Available from NTIS, Springfield, Va., as Rpt. No HASL-273; $3.00 per copy, $0.95 microfiche. Report No. HASL-273, April 1, 1973. 227 p, 24 fig, 39 tab, 87 ref, 1 bib.

Descriptors: *Radioactivity, *Radioisotopes, *Fallout, *Water pollution, Marine algae, Marine animals, Aquatic life, Water pollution sources, Air pollution, Soil contamination, Assay, Measurement, Food chains, Public health, Milk, Water, Strontium, Lead.

Current data are reported from the HASL Fallout Program; The Laboratory of Radiation Ecology, University of Washington; and the EURATOM Joint Nuclear Research Centre at Ispra, Italy. The initial section consists of interpretive reports on radium daughter products and lead in marine organisms, inventories of radionuclides in the stratosphere, strontium-90 in diet, and the tropospheric baseline concentration of lead. Subsequent sections include tabulations of radionuclide levels in fallout, surface air, stratospheric air, foods, milk,

and tap water. A bibliography of recent publications related to radionuclide strudies is also presented. (See also W73-10176) (Houser-ORNL)
W73-10175

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAMS - QUARTERLY SUMMARY REPORT. (DEC. 1, 1972 THROUGH MARCH 1, 1973),
New York Operations Office (AEC), N.Y. Health and Safety Lab.
E. P. Hardy, Jr.
Available from NTIS, Springfield, Va., as Rpt. HASL-273 Append., $6 per copy, $0.95 microfiche. Report No. HASL-273 Appendix, April 1, 1973. 451 p.

Descriptors: *Data collections, *Fallout, *Radioactivity, *Radioisotopes, *Strontium, Sampling, Atlantic Ocean, Air pollution, Lead, Water pollution, Water pollution sources, Assay, Milk, Water table.

Current data from HASL Fallout Program are reported in six appendices, as follows: Appendix A, Sr-90 and Sr-89 in monthly deposition at world land sites. Appendix B, Radiostrontium deposition at Atlantic Ocean weather stations. Appendix C, Radionuclides and lead in surface air. Appendix D, Radiostrontium in milk and tap water. Appendix E, Table of conversion factors. Appendix F, Table of radionuclides. (See also W73-10175) (Houser-ORNL)
W73-10176

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SALEM NUCLEAR GENERATING STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50272-57, $3.00 per copy, $0.95 microfiche. Dockets 50272-57 and 50311-57, April 1973. 264 p, 21 fig, 33 tab, 95 ref, 6 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Delaware River, *New Jersey, *Thermal pollution.
Identifiers: Pressurized water reactors, *Salem (N.J.), *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed continuation of the provisional construction permits and operation licenses of the Salem Nuclear Generating Station Units 1 and 2. The station is located on Artificial Island in the Delaware River, state of New Jersey, near Salem. The two units will be pressurized water reactors cooled by once-through flow of brackish water from and discharged to the Delaware River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was complied. Some environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permits and issue operating licenses for the facility subject to the following conditions: (1) Establish baseline studies of plankton and zooplankton losses and a continuing program of monitoring for protection of aquatic life; (2) Measurement of chlorine concentration in discharge; (3) Establish necessary radiological and environmental monitoring practices; and (4) Propose a course of action to alleviate other detectable harmful effects. (Houser-ORNL)
W73-10177

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket 50277-83; $6.00 per copy, $0.95 microfiche. Dockets 50277-83 and 50278-77, April 1973. 530 p, 44 fig, 69 tab, 333 ref, 14 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Site, Climatology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Pennsylvania, *Thermal pollution.
Identifiers: Boiling water reactors, *Susquehanna River, *Environmental impact statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction and operation of the Peach Bottom Station, Units 2 and 3, located on the Susquehanna River, Peach Bottom, Pennsylvania. The exhaust steam will be cooled by once-through flow of water obtained from and discharged to the Susquehanna River and also by forced-draft towers when needed. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusion is to continue the construction permits and issue an operating license subject to the following conditions for the protection of the environment: (1) Carry out both radiological and nonradiological monitoring programs for assessment of impacts; (2) require a closed-cycle cooling system after Nov. 1, 1975, and furnish an impact evaluation of the system; (3) restriction of chlorine concentration; (4) reduce iodine releases to as low as practicable; (5) furnish plan of action to reduce significantly any harmful effects. (Houser-ORNL)
W73-10178

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED SAN ONOFRE NUCLEAR GENERATING STATION - UNITS 2 AND 3.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, Springfield, Va., as Docket No. 50361-37. $6.00 per copy, $0.95 microfiche. Docket Number 50361-37. March 1973. 459 p, 50 fig, 53 tab, 366 ref, 6 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Climatology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Pacific Ocean, Plankton, Fishkill, *California, *Thermal pollution.
Identifiers: *Pressurized water reactors, *San Onofre (Calif), *Environmental impact statements.

The final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction of the San Onofre Nuclear Generating Station, Units 2 and 3, pressurized water reactors using once-through water from the Pacific Ocean, Camp Pendleton, California. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded that construction permits should be issued for the facilities subject to certain requirements affecting cooling water discharges, chlorine concentration discharges, construction practices, and expansion of the current environmental monitoring program. (Houser-ORNL)
W73-10179

CALCULATIONS OF ENVIRONMENTAL RADIATION EXPOSURES AND POPULATION DOSES DUE TO EFFLUENTS FROM A NUCLEAR FUEL REPROCESSING PLANT,
Office of Radiation Programs, Washington, D.C.
J. A. Martin, Jr.
Available from U.S. Govt. Printing Office, Washington, D.C.; $1.00 per copy. Radiation Data and Reports, Vol 14, No 2, p 59-76, Feb 1973. 6 fig, 12 tab, 33 ref, 1 bib.

Descriptors: *Nuclear energy, *Industrial plants, Effluents, *Nuclear wastes, *Air pollution, Water pollution, Fallout, Water pollution sources, Assay, Measurement, Survey, Sampling, Public health, Monitoring, Radioisotopes, Iodine, Strontium, Cesium, Tritium, Krypton, Radioisotopes, Regulation, Path of pollutant, Food chains, *New York.
Identifiers: Ruthenium, Concentration, West Valley, Fuel reprocessing, *Nuclear fuel services, Buttermilk Creek, Chattaraugas Creek.

Effluent and environmental data pertinent to the Nuclear Fuel Services nuclear fuel reprocessing plant in West Valley, N.Y., were analyzed to determine doses to sample populations. Individual doses to the maximally exposed population group were considered. Population doses (man-rems) from air, fish, deer, and water pathways were calculated. The most significant radionuclides contributing to doses were tritium, krypton-85, strontium-90, cesium-134, and cesium-137. It was concluded that the impact of this facility upon humans was well below applicable guides in 1971. (Houser-ORNL)
W73-10180

RADIATION DATA, SECTION II, WATER.
Office of Radiation Programs, Washington, D.C.

Available from U.S. Supt. of Documents, Washington, D.C.; $1.00 per copy. Radiation Data and Reports, Vol 14, No 2, p 102-114, Feb 1973. 16 fig, 18 tab, 26 ref.

Descriptors: *Monitoring, *Sampling, *Assay, *Radioactivity, Environment, *Data collections, Air pollution, Water pollution, Water pollution sources, Radioisotopes, Nuclear explosions, Fallout, Nuclear powerplants, Effluents, Nuclear wastes, Regulation, Federal Government, Radioisotopes, Food chains, Public health, *Kansas, *Tritium.

Data are provided by federal, state, and foreign governmental agencies and other cooperating organizations. Data reported are accumulated from surveillance programs concerning: radioactivity in Kansas surface waters, January-December 1971; tritium surveillance system, July-September 1972; and water surveillance programs, Nevada test site area, April-June 1972. Also given are environmen-

tal levels of radioactivity at some Atomic Energy Commission installations. Some of the more important radioisotopes of concern are strontium, cesium, iodine, barium, cobalt, xenon, and krypton. (Houser-ORNL)
W73-10181

DIFFUSION IN COMPLEX SYSTEMS,
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 02K.
W73-10183

ENVIRONMENTAL SURVEILLANCE FOR RADIOACTIVITY IN THE VICINITY OF THE CRYSTAL RIVER NUCLEAR POWER PLANT, AN ECOLOGICAL APPROACH,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
W. E. Bolch.
Progress Report, Florida Power Corp., St. Petersburg, April 7, 1973. 51 p, 5 fig, 8 tab, 45 ref.

Descriptors: *Gamma rays, *Spectrometers, *Radioisotopes, *Absorption, Environmental effects, Radioecology, Nuclear wastes, *Path of pollutants, Nuclear powerplants, Water pollution, Air pollution, Monitoring, Public health, Sampling, Marine biology, *Florida, Bioassay, Terrestrial habitats, Estuarine environment, Marshes, Marine fish, Food webs.
Identifiers: *Crystal River Nuclear Powerplant (Fla).

Preoperational data obtained to about Jan. 1, 1973, are reported. Samples of air, water, and biota from marine, marshland, fresh water, and terrestrial ecosystems were analyzed by gamma radiation spectroscopy for Ra226, Th232, Zr95, Ru106, Cs137, and other radioisotopes present in lesser amounts (I, Zn, Ba, Mn, Br, and Cd). Quantitative gravimetric analyses of stomach contents of 20 fishes (juveniles) that cohabit seagrass beds delineated ontogenetic changes in food habits in many species. The possibility was considered that detritus may serve as the major energy base utilized by juveniles of most species of these fish. (See also W73-01718) (Bopp-ORNL)
W73-10185

MOVEMENT OF ZN65 INTO SOILS FROM SURFACE APPLICATION OF ZN SULPHATE IN COLUMNS,
Haile Sellassie I Univ., Alem Maya (Ethiopia). Coll. of Agriculture.
For primary bibliographic entry see Field 02G.
W73-10191

BEHAVIOUR OF RU IN AN ESTABLISHED PASTURE SOIL AND ITS UPTAKE BY GRASSES,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
R. Kirchmann, and T. J. D'Souza.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 587-593, 3 fig, 2 tab, 7 ref.

Descriptors: *Soil water movement, *Soil-water-plant relationships, *Nuclear wastes, *Food chains, Milk, Path of pollutants, Soil contamination, Fallout, Absorption, Hay, Clover, Public health, Radioecology, Soil science.
Identifiers: Ruthenium radioisotopes.

When Ru106 chloride solution was sprayed on pastures, uptake by grass occurred largely by foliar absorption and by contamination of the plant base rather than through the soil-water pathway. Short-term fixation was in both fine-mineral and organic components of the soil, but migration to the 10-25 cm depth was continuing after two months. About 9.5% of the activity was in the aerial parts two days following deposition; the half-time in the field for retention by plant matter was about 8 days. Less than 0.0006% of the activity ingested by cows in a day was secreted in one liter of milk, much less than for Sr85 (0.06%) and Cs134 (0.4%). (See also W72-10679) (Bopp-ORNL)
W73-10192

DISTRIBUTION OF RADIOSTRONTIUM AND RADIOCAESIUM IN THE ORGANIC AND MINERAL FRACTIONS OF PASTURE SOILS AND THEIR SUBSEQUENT TRANSFER TO GRASSES,
Centre d'Etude de l'Energie Nucleaire, Mol (Belgium). Laboratoires.
T. J. D'Souza, R. Kirchmann, and J. J. Lehr.
In: Proceedings of Symposium on the Use of Isotopes and Radiation in Research on Soil-Plant Relationships Including Applications in Forestry, Dec 13-17, 1971, Vienna (IAEA-SM-151), International Atomic Energy Agency, Vienna, 1972, p 595-604. 7 fig, 4 tab, 8 ref.

Descriptors: *Soil-water-plant relationships, *Grasslands, *Pastures, *Fallout, Absorption, *Strontium, Radioisotopes, Food chains, Path of pollutants, Moisture availability, Monthly, Clay loam, Organic soils, Soil contamination, Crop response, Radioecology, Soil science.
Identifiers: *Cesium radioisotopes, *Belgium.

Pasture soils from four different locations in Belgium, artifically contaminated, were studied. The Sr/Ca ratio in the organic component of the four soils decreased from about 2.7 to 1.3 times that in the mineral component as the clay component (particle size less than 2 microns) increased from 2.2 to 15.8%. Both Sr85 and Cs134 were more readily available to plants when present in the organic matter as compared with the clay. Greenhouse studies of the effect of varying the content of organic matter in sand-clay mixtures will be reported in the future. (See also W72-10679) (Bopp-ORNL)
W73-10193

ANNUAL ENVIRONMENTAL MONITORING REPORT: CALENDAR YEAR 1972,
Mound Lab., Miamisburg, Ohio.
D. G. Carfagno, and W. H. Wastendorf.
Available from NTIS, Springfield, Va., as Report No. MLM-2028; $3.00 per copy, $0.95 microfiche. Report No. MLM-2028, March 15, 1973. 32 p, 3 fig, 18 tab, 5 ref, 1 append.

Descriptors: Environment, Monitoring, Radioactivity, Radioisotopes, Assay, Measurement, Tritium, Regulation, Public health, Sampling, Analytical techniques, Air pollution, Water pollution, Soil contamination, Toxicity, Administrative agencies, Water pollution sources.
Identifiers: *Polonium, *Plutonium.

The environment surrounding Mound Laboratory was monitored and reported on for calendar year 1972. Samples analyzed and reported on included air, water, foodstuffs, soil and silt. For radioactive species, the average concentrations of polonium-210, plutonium-238 and tritium detected were well within the stringent standards adopted by the Atomic Energy Commission and the Environmental Protection Agency. Data concerning non-radioactive species in air and water are also presented. Data for these indicate that Mound Laboratory operations have neglibible effect on the environment. (Houser-ONRL)
W73-10201

ENVIRONMENTAL LEVELS OF RADIOACTIVITY IN THE VICINITY OF THE LAWRENCE LIVERMORE LABORATORY: 1972 ANNUAL REPORT,
California Univ., Livermore. Lawrence Livermore Lab.
P. H. Gudiksen, C. L. Lindeken, J. W. Meadows, and K. O. Hamby.
Available from NTIS, Springfield, Va., as Rept. UCRL-51333; $3.00 per copy, $0.95 microfiche. Report No. UCRL-51333, March 7, 1973. 42 p, 11 fig, 26 tab, 8 ref, 1 append.

Descriptors: *Monitoring, *Radioactivity, *Radioisotopes, Tritium, Uranium, Plutonium, Sampling, Analytical techniques, Air pollution, Water pollution sources, Soil contamination, Milk, Food chains, Public health, Assay, Measurement.
Identifiers: *Lawrence Livermore Laboratory.

The Lawrence Livermore Laboratory continuously monitors the levels of radioactivity within the Livermore Valley and Site 300. Results of analyses performed during 1972 for gross radioactivity and for specific radioisotopes of interest in a variety of environmental samples are presented. In all cases, the levels of radioactivity were below the concentration-guide values in AEC Manual Chapter 0524. Sampling included airborne particles, soil, vegetation, and water. Assessment of the radiation doses to an individual from the observed environmental activities indicates the contribution from artificially produced radionuclides is small in comparison with the approximately 100-mrem/yr dose received from natural sources. (Houser-ORNL)
W73-10202

AQUATIC RADIOLOGICAL ASSESSMENTS AT NUCLEAR POWER PLANTS,
Portland General Electric Co., Oreg.
J. W. Lentsch.
In: Water Quality Considerations for Siting and Operating Nuclear Power Plants, Oct 1-4, 1972, Washington, D.C., Atomic Industrial Forum, Inc., New York, New York, 36 p, 2 fig, 46 ref.

Descriptors: *Nuclear wastes, *Nuclear powerplants, *Effluents, *Public health, Path of pollutants, Monitoring, Radioisotopes, Absorption, Fish diets, Estuarine environment, Environmental effects, Forecasting, Systems analysis.

Assurance that dose guidelines are not exceeded requires evaluation and continual environmental monitoring of possible pathways (utilization of water supplies including irrigation and recreational facilities, and consumption of edible biota). Which pathways require detailed consideration are generally indicated by approximations with regard to dilution, biological concentration, and sedimentation. For predicting radionuclide uptake by aquatic organisms, the 'specific activity' method (see W72-04484) is known to be adequate for Sr90, Cs137, Zn65, and Mn54; but in the use of 'concentration factors' more conservatism is required with estuarine ecosystems as compared with freshwater or marine ecosystems. Methods are outlined for predicting radionuclide uptake by sediments, soil, irrigated crops, and cattle flesh; and for assessing internal and external doses. (Bopp-ORNL)
W73-10204

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONTINUATION OF CONSTRUCTION AND OPERATION OF UNITS 1 AND 2 AND CONSTRUCTION OF UNITS 3 AND 4 OF NORTH ANNA POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.

Available from NTIS, SPringfield, Va., as Docket 50338-60; $6.00 per copy, $0.95 microfiche. Docket No. 50338-60. April 1973. 474 p, 43 fig, 40 tab, 208 ref, 4 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Climatology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Lakes, *Virginia, *Thermal pollution.
Identifiers: *Pressurized water reactors, Lake Anna, *Anna River, Environmental Impact Statements.

This final environmental statement was prepared in compliance with the National Environmental Policy Act and relates to the proposed construction and operation of the North Anna Power Station. This station is located on the North Anna River, Virginia, near the town of Mineral. The four units will employ pressurized water reactors and be cooled by once-through flow of water obtained from and discharged to Lake Anna. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and groundwater), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. The conclusions reached are: (1) continue construction permits for units 1 and 2; (2) issue operating license for units 1 and 2; (3) issue construction permits for units 3 and 4; (4) necessary monitoring programs are to be continued and modified to assess the impact of construction and operation; (5) if harmful effects appear, the applicant will propose action to alleviate the problem. (Houser-ORNL)
W73-10205

ENVIRONMENTAL MONITORING AT ARGONNE NATIONAL LABORATORY - ANNUAL REPORT FOR 1972,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 05A.
W73-10206

RADIOACTIVITY OF THE WATER OF THE NORTHEASTERN PART OF THE ATLANTIC OCEAN,
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
I. P. Baksheyeva, A. D. Zemlyanoy, V. N. Markelov, and B. A. Nelepo.
Oceanology, Vol 11, No 6, p 861-867, 4 fig, 1 tab, 22 ref. Translated from Okeanologiia, Vol 11, No 6, 1971.

Descriptors: *Water pollution sources, *Radioactive wastes, Industries, *Nuclear powerplants, *Nuclear explosions, Testing, *Strontium, Distribution patterns, *Atlantic Ocean.
Identifiers: Irish Sea, Hebrides, Orkneyes.

Radioactive wastes from atomic industrial facilities along with radioactive fission products from nuclear weapon tests discharged into the ocean are an important source of radioactive contamination of some regions of the world's oceans. Spatial distribution studies in the northeastern Atlantic indicated that the content of 90Sr at the end of 1965 and the beginning of 1966 was higher than the average level for the ocean and amounted to about 53 counts/min-100 l in the surface layer. The most intense transport of artificial radioactive products out of the Irish Sea was detected in the northern and northeastern directions along the Hebrides and the Orkneyes. (Ensign-PAI)
W73-10220

POLYCHLORINATED BIPHENYLS-ENVIRONMENTAL IMPACT. A REVIEW BY THE PANEL ON HAZARDOUS TRACE SUBSTANCES. MARCH 1972,
Minnesota Univ., St. Paul. Coll. of Veterinary Medicine.
P. B. Hammond, I. C. I. Nisbet, A. F. Sarofim, W. H. Drury, and N. Nelson.
Environmental Research, Vol 5, No 3, p 249-362, September 1972. 15 fig, 32 tab, 234 ref.

Descriptors: *Polychlorinated biphenyls, *Properties, Industrial production, Use rates, Transfer, *Toxicity, *Environmental effects, Analytical techniques, Model studies, Chemicals, Testing, Laboratory tests, On site tests, *Trace elements, *Reviews, Bibliographies.
Identifiers: Transport, Transformation, *Hazardous substances.

A review of the literature concerning polychlorinated biphenyls (PCBs) is presented. The properties, production, and uses of PCBs; their transport and transformation in the environment; environmental occurrence and human exposure to PCBs; toxic impurities; biological effects; and analytical methods are discussed. Systems models need to be developed to describe environmental transport of PCBs and to predict the effects of varying inputs of the chemicals in sensitive areas. Testing procedures should be established to effectively screen potentially hazardous chemicals before they become large scale environmental pollutants. Further study needs to be done on the effects of pollutants on field populations, so that laboratory results can be correlated with observations in the natural environment. These needs apply not only to PCBs but to a wide range of chemicals. (Ensign-PAI)
W73-10221

AIR FLOW LAND-SEA-AIR-INTERFACE: MONTEREY BAY, CALIFORNIA - 1971,
Moss Landing Marine Labs., Calif.
R. G. Read.
Technical Publication No 72-4, 1972. 28 p, 15 fig, 4 ref. NOAA 2-35137.

Descriptors: *Coasts, *Bays, *Air pollution effects, Transport, *Waste dilution, Trapping, *Air-Earth interfaces, *Air-water interfaces, Winds, Flow, Velocity, Industries, Urbanization, Planning, Atmosphere, *California, Dilution.
Identifiers: *Monterey Bay (Calif).

The atmospheric conditions that determine the transport, dilution, and trapping of air pollutants in the coastal areas of Monterey Bay and the Salinas Valley are greatly influenced by the air flow at the land-sea-air interface. Analysis of the hourly air flow on a daily and monthly basis indicates patterns of stagnation from midnight to noon of the following day with moderate to strong air flow during the period 1:00 to 10:00 p.m. Whenever flow was >5mph, the prevailing wind direction was onshore and from a westerly direction throughout 1971. Suggestions for urbanization and industrialization are made on the basis of an understanding of the atmospheric conditions which lead to trapping and dispersal of atmospheric waste. (Ensign-PAI)
W73-10223

THE FLUXES OF MARINE CHEMISTRY,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 02K.
W73-10225

THE IMPACT OF ARTIFICIAL RADIOACTIVITY ON THE OCEANS AND ON OCEANOGRAPHY,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
A. Preston, D. S. Woodhead, N. T. Mitchell, and R. J. Pentreath.
Proceedings of the Royal Society of Edinburgh. Section B: Biology, Vol 72, p 411-423, 1971/72. 1 fig, 5 tab, 85 ref.

Descriptors: *Oceans, *Radioisotopes, *Nuclear explosions, *Radioactive wastes, *Fallout, *Distribution patterns, Toxicity, Environmental effects, Natural resources, Water pollution control.

A total inventory of artificial radionuclides introduced into the world oceans is presented. Weapon fallout is the largest artificial component, but it is spread throughout surface waters and occurs at very low concentrations. Radioactive waste is extremely restricted in its geographic distribution and therefore occurs at relatively high concentrations. Artificial radionuclides have widely varying radiotoxicities and their significance in a particular environment depends not only on their radiotoxicities but also upon the components of that environment and the uses of the radionuclides leading to radiation exposure. The impact of radioactive waste disposal on marine resources is assessed, and control measures are discussed. Physical, chemical, and biological parameters determining the distribution of various radionuclides introduced into the oceans are examined. (Ensign-PAI)
W73-10226

CURRENT STATUS OF KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF HEAVY METALS IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Medicine.
For primary bibliographic entry see Field 05C.
W73-10232

CURRENT STATUS OF KNOWLEDGE CONCERNING THE CAUSE AND BIOLOGICAL EFFECTS OF EUTROPHICATION IN CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
For primary bibliographic entry see Field 05C.
W73-10233

BIOLOGICAL CRITERIA OF ENVIRONMENTAL CHANGE IN THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point. Dept. of Ecology-Pollution.
R. C. Swartz.
Chesapeake Science, Vol 13, (Supplement), p S17-S41, December 1972. 1 fig, 5 tab, 121 ref.

Descriptors: *Chesapeake Bay, *Biota, Biology, *Estuarine environment, *Environmental effects, Analytical techniques, Bioassay, Application methods, Aquatic populations, Biological communities, Structure, Metabolism, Bioindicators, Habitats, Seasonal, Bays.
Identifiers: Change of conditions.

Biological phenomena in the Chesapeake Bay are expectionally complex. Simple, unequivocal standards for characterizing biotic conditions are not available. A review of techniques for the determination of direction and rate of change of conditions in the Bay is provided. Specific bioassays and their applicability to situations in the Bay are discussed. Condition indices, population dynamics, community structure, and community metabolism are also sensitive indicators of environmental disturbance. For the immediate future it is desirable to rely upon several different procedures to document biological changes. The method selected will depend upon the habitat, season, and nature of the environmental alteration. (Ensign-PAI)
W73-10235

(BIOTA OF THE CHESAPEAKE BAY), CONCLUSIONS AND RECOMMENDATIONS,
Maryland Univ., Prince Frederick, Hallowing Point Field Station.

A. J. McErlean, C. Kerby, R. C. Swartz, and L. C. Kohlenstein.
Chesapeake Science, Vol 13, (Supplement), p S8-S16, December 1972.

Descriptors: *Chesapeake Bay, *Biota, Biology, *Water pollution, *Estuarine environment, *Environmental effects, *Bioindicators, Information exchange, Data storage and retrieval, Analysis, Forecasting, Bays.

An estimate of the current status of biological knowledge of the Chesapeake Bay is presented. The applicability of this knowledge to the prediction of the effects of environmental modifications due to man's activities is discussed. Emphasis is on the use of estuarine organisms as indicators of changes within the Bay. A review of existing knowledge of Bay organisms reveals the need for useful quantitative information. A system for storage, retrieval, and analysis of data is presented. (Ensign-PAI)
W73-10236

THE PROTECTED OCEAN, HOW TO KEEP THE SEAS ALIVE,
For primary bibliographic entry see Field 05G.
W73-10243

EFFECTS OF OIL UNDER SEA ICE,
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
L. S. Wolfe, and D. P. Hoult.
Publication No 72-10, August 1972. 39 p, 8 fig, 17 ref. Contract USCG-DOT-CG-12438-A.

Descriptors: *Arctic Ocean, *Ice, Oil, Environmental effects, Temperature distribution, Currents, Gravity, Turbulent flow, Heat transfer, Friction, Shear stress, Mathematical studies, Water pollution sources.
Identifiers: *Oil layers, Adhering thickness, Oil spreading.

Laboratory research performed to determine the effects of crude and diesel oils on the porous substructure of Arctic sea ice is described. A quantitative description of what occurs when oil is placed under the ice and an evaluation of some quantitative measurements made to determine the maximum extent to which crude oil can spread in an Arctic environment are included. (Ensign-PAI)
W73-10246

TRACE METAL ENVIRONMENTS NEAR SHELL BANKS IN DELAWARE BAY,
Delaware Univ., Newark. Dept. of Geology.
F. Bopp, III, and R. B. Biggs.
College of Marine Studies, Report DEL-SG-9-72, December 1972. 47 p, 1 fig, 3 tab, 4 ref. NOAA Grant No 2-35223.

Descriptors: *Bays, Tracers, *Metals, *Distribution patterns, Sediments, Oysters, Erosion, Transport, Deposition, Iron, Magnesium, Zinc, Chromium, Copper, Lead, Cadmium, Mercury, Nickel, Strontium, *Trace elements.
Identifiers: *Delaware Bay, Delaware River, Murderkill River, Cohansey River.

Sources and primary factors controlling distribution of 10 trace metals (Fe, Mg, Zn, Cr, Cu, Pb, Cd, Hg, Ni, and Sr) in sedimentary environments supporting oysters in Delaware Bay were studied. Fine-grained materials are being eroded from tidal marshes and are accumulating in the nearshore bay area. Preferential deposition of fine-grained materials carried into the bay by the Delaware River occurs, and deposition of river-borne materials is found near the middle of the navigational channel up to the New Jersey side of the bay in the uppermost reaches, approaching the Delaware side of the bay between Port Mahon and the Murderkill and St. Jones river mouths. Fe, Zn, Pb, Cd, Hg, and Ni have their primary sources in the Delaware River, and Mg, Cr, Cu, and Sr have predominately seaborne sources. Water currents seem to be the primary factor influencing distribution of these materials, regardless of source. A 'hot spot' of high concentrations of Cr, Cu, Pb, and Sr appears associated with the mouth of the Cohansey River, and there seems to be a sink of trace metals being formed offshore from the mouths of the Murderkill and St. Jones rivers. (Ensign-PAI)
W73-10250

RISK ANALYSIS OF THE OIL TRANSPORTAION SYSTEM.

Pacific Northwest SEA, Vol. 5, No 4, 22 p, 1972.

Descriptors: *Pacific Northwest U.S., *Washington, *Oil spills, *Transportation, *Hazards, Equipment, Operations research, Training, Manpower, Accidents, Data collections, Data transmission, Regulations.
Identifiers: *Risk analysis.

A program for assessing the risks of oil spills in Washington State waters is discussed, and hazards inherent in transportation operations are considered. Fault tree analysis is described, and ways of reducing risk levels are suggested, including improving equipment, operations and maintenance procedures, and crew selection and training; diverting petroleum crudes and products to transportation modes and systems other than ships; improving accident data acquisition and distribution; and improving system controls, regulations, and enforcement actions. (Ensign-PAI)
W73-10251

INDICATOR SPECIES--A CASE FOR CAUTION,
University Coll. of North Wales, Bangor. Marine Science Labs.
R. A. Eagle, and E. I. S. Rees.
Marine Pollution Bulletin, London, Vol 4, No 2, p 25, February 1973.

Descriptors: *Bioindicators, *Outlets, Construction, *Sewage, Sands, Silts, Clay, Habitats, Water pollution sources, Path of pollutants.
Identifiers: *Polychaetes, Capitella capitata.

The polychaete worm Capitella capitata is one of the best indicators of organic enrichment in coastal seas. It is often found in abundance areound sewage outfalls. A case is presented in which this polychaete colonized an outfall area before sewage discharge. The cause of colonization is attributed to construction of the outfall. Sand, silt, and clay displaced during construction fell close to the pipe providing an adequate habitat for colonization. Populations of C. capitata may be due to temporary disturbance of the environment rather than to sewage effluent; thus, their use as bioindicators should be viewed with caution. (Ensign-PAI)
W73-10252

POLLUTION AND THE OFFSHORE OIL INDUSTRY,
British Petroleum Co. Ltd., Sunbury-on-Thames (England).
T. E. Lester, and L. R. Beynon.
Marine Pollution Bulletin, London, Vol 4, No 2, p 23-25, February 1973.

Descriptors: *Exploration, *Exploitation, *Oil pollution, *Water pollution, Oil wells, Accidents, Environmental effects, Planning.
Identifiers: *North Sea, Gulf of Mexico, Santa Barbara.

Exploration and exploitation of the North Sea oil field has caused concern about the possibility of major oil pollution. Three major accidents to offshore wells, Santa Barbara in Jan. 1969, Gulf of Mexico in spring 1970, and Gulf of Mexico in Dec. 1970, are examined to discover the risk and likely consequences of a blow-out in the North Sea. Biological effects, spillage estimates, and contingency plans are discussed. (Ensign-PAI)
W73-10253

ENVIRONMENTAL RADIOACTIVITY IN MICHIGAN, 1970,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 05A.
W73-10262

ALPHA-RECOIL THORIUM-234: DISSOLUTION INTO WATER AND THE URANIUM-234/URANIUM-238 DISEQUILIBRIUM IN NATURE,
Gakushuin Univ., Tokyo (Japan). Dept. of Chemistry.
K. Kigoshi.
Science, Vol 173, No 3991, p 47-48, July 2, 1971. 1 fig, 1 tab, 5 ref.

Descriptors: *Water pollution sources, *Groundwater, *Radioactivity, *Uranium radioisotopes, Sediments, Path of pollutants, Analytical techniques, Water analysis, Soil types, Soil properties, Infiltration, Leaching, Groundwater movement.
Identifiers: Residence time.

In laboratory leaching experiments on fresh igneous rocks or minerals, solutions containing uranium-234 have been found to contain less than 1.3 times the equilibrium amount of uranium-238. The rate of ejection of alpha-recoil thorium-234 into solution from the surface of zircon sand gives an alpha-recoil range of 550 angstroms. The alpha-recoil thorium-234 atoms ejected into the groundwater may supply excess uranium-234. In pelagic sediments, ejected alpha-recoil thorium-234 may contribute to the supply of mobile uranium-234 in the sedimentary column. (Woodard-USGS)
W73-10325

NON-EQUILIBRIUM PHENOMENA IN CHEMICAL TRANSPORT BY GROUND-WATER FLOW SYSTEMS,
Nevada Univ., Reno. Desert Research Inst.
C. L. Carnahan, and J. V. A. Sharp.
In: Proceedings of Fall Annual Meeting of the American Geophysical Union, December 5, 1972, San Francisco, California: Preprint No 72, Paper H-16, 1972. 13 p, 7 fig, 10 ref. OWRR A-046-NEV (1).

Descriptors: *Path of pollutants, *Groundwater movement, *Water chemistry, *Thermodynamics, *Ion transport, Equilibrium, Entropy, Free energy, Heat flow, Diffusion, Translocation, Chemical reactions.

The methods of irreversible thermodynamics provide a self-consistent and unifying approach to study of simultaneous, coupled, non-equilibrium processes affecting chemical mobilization and transport in groundwater systems, where the systems are acted upon by a variety of gradients and forces. Although the methods are applicable to any groundwater flow system, certain cases of special interest can be identified. These include chemical processes in regions of large thermal gradients and transient interactions of contaminants introduced into aquifers. (Knapp-USGS)
W73-10329

GROUNDWATER QUALITY IN THE CORTARO AREA NORTHWEST OF TUCSON, ARIZONA,
K. D. Schmidt.
Water Resources Bulletin, Vol 9, No 3, p 598-606, June 1973. 2 fig, 3 tab, 12 ref.

Descriptors: *Water quality, *Groundwater, *Path of pollutants, *Arizona, *Waste disposal, Sewage disposal, Infiltration, Nitrates, Coliforms, Alluvium, Malencaves, Hydrogeology, Groundwater movement.
Identifiers: *Tucson (Ariz).

The Cortaro area is used for disposal of much of the liquid waste from the city of Tucson, Arizona. In the past, more than one-half of the sewage effluent was used for crop irrigation. However, since 1970 virtually all of the sewage effluent has been percolated in the normally dry Santa Cruz River channel. Nitrate and chloride contents are monitored in water samples from about 20 large-capacity irrigation wells. Contents and seasonal trends for these constituents are closely related to the disposal of sewage effluent. Water quality problems other than nitrate include total dissolved solids, boron, coliform, and lead. High lead contents in the area appear to be a natural phenomenon and the coliform contents are related to poor well construction. The other quality problems are primarily caused by sewage effluent. (Knapp-USGS)
W73-10332

RELATIVE LEACHING POTENTIALS ESTIMATED FROM HYDROLOGIC SOIL GROUPS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 02G.
W73-10333

SYMPOSIUM ON DIRECT TRACER MEASUREMENT OF THE REAERATION CAPACITY OF STREAMS AND ESTUARIES.

Copy available from GPO Sup Doc as EP1.16:16050 for 01/72, $1.00; microfiche from NTIS as PB-218 478, $0.95. Environmental Protection Agency Water Pollution Control Research Series 16050 for 01/72, January 1972. 193 p, 72 fig, 12 tab, 58 ref. Project No. 16050 for 01/72.

Descriptors: *Mixing, *Turbulence, *Reaeration, *Tracers, Pollutants, Estuaries, Detergents, Domestic wastes, Fluorescent dyes, Oxygen, Streams, Analytical techniques, Rivers, Hydraulic properties, Water pollution effects, Tritium, On-site data collections, Measurement, Model studies, Radioisotopes, Dissolved oxygen, Biochemical oxygen demand, Radioactivity techniques, Sampling, Linear alkylate sulfonates.
Identifiers: *Gas transfer, *Krypton, Kr-85, Reaeration capacity, Oxygen balance, Yaquina River, South River, Chattahoochee River, James River, Flint River, Patuxent River.

Papers presented at a symposium at the Georgia Institute of Technology, Atlanta, during July 7-8, 1970, reflect the state-of-the-art of measuring and predicting the reaeration capacity of streams and estuaries. The papers presented were as follows: 'Turbulence, Mixing and Gas Transfer' by E. C. Tsivoglou; 'Relative Gas Transfer Characteristics of Krypton and Oxygen' by E. C. Tsivoglou; 'Field Tracer Procedures and Mathematical Basis' by J. R. Wallace; 'Field Hydraulic Studies' by J. R. Wallace and D. E. Hicks; 'Laboratory Procedures' by R. J. Velten; 'Reaeration Capacity of the Flint, South and Patuxent Rivers' by E. C. Tsivoglou; 'Oxygen Balance of the South River' by A. G. Herndon; 'Reaeration Studies of the Chattahoochee River' by J. R. Wallace; 'Model Study of Reaeration Capacity of the James River Estuary (Virginia)' by M. W. Lammering; 'Field Studies in Yaquina River Estuary of Surface Gas Transfer Rates' by D. J. Baumgartner, M. H. Feldman, L. C. Bentsen, and T. L. Cooper; 'Radiological Safety' by Jon R. Longstin; 'Effect of Hydraulic Properties on Reaeration' by Edward L. Thackston; 'Pollutant Effects on Reaeration' by L. A. Neal; 'Observed vs. Calculated Reaeration Capacities of Several Streams' by J. R. Wallace; 'Relationships Between Hydraulic Properties and Reaeration' by E. C. Tsivoglou. (See W73-10338 thru W73-10352) (Snyder-Battelle)
W73-10337

TURBULENCE, MIXING AND GAS TRANSFER,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
E. C. Tsivoglou.
In: Proceedings of a Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 5-18, January 1972. 4 fig. 8 ref.

Descriptors: *Reaeration, *Dissolved oxygen, *Tracers, *Water chemistry, Biodegradation, Biochemical oxygen demand, Path of pollutants, Turbulence, Mixing, Oxygen sag, Self-purification, Diffusion.

A brief outline is given of the principles of gas transfer in turbulent streams. Stream self-purification involves the depletion of dissolved oxygen by bacterial degradation of organic wastes and replenishment of the dissolved oxygen by absorption of oxygen from the atmosphere. Reaeration is a direct function of turbulence. The purpose of recent research has been to define the hydraulic properties that determine the reaeration coefficient in real streams; this is tantamount to attempting to define the rate of surface replacement in terms of measurable hydraulic properties such as velocity, depth, time of flow, hydraulic gradient, hydraulic radius, flow, roughness, and wetted perimeter. (See also W73-10337) Knapp-USGS)
W73-10338

RELATIVE GAS TRANSFER CHARACTERISTICS OF KRYPTON AND OXYGEN,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
E. C. Tsivoglou.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 19-30, January 1972. 6 fig, 1 ref.

Descriptors: *Tracers, *Reaeration, *Krypton radioisotopes, *Radioactivity techniques, *Dissolved oxygen, Water chemistry, Mixing, Oxygen sag, Aeration, Dispersion, Self-purification, Diffusion, Path of pollutants, Turbulence.

Accurate evaluation of stream reaeration capacity is a problem of major importance in water pollution control. A gaseous tracer for dissolved oxygen can be used to circumvent problems of measurement that have proved to be otherwise insurmountable. The relative gas transfer capability of krypton-85 and oxygen, measured as the ratio of reaction rate coefficients, is 0.83, the transfer of krypton-85 being the slower process. The transfer ratio is not significantly affected by temperature over the range 10 deg C to 32 deg C, by the degree of turbulent mixing over the range studied, by the direction in which the gases transfer (into or out of the water), or by the presence of a broken water surface. (See also W73-10337) (Knapp-USGS)
W73-10339

FIELD TRACER PROCEDURES AND MATHEMATICAL BASIS,
J. R. Wallace.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8 , 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 31-41, January 1972. 4 fig.

Descriptors: *Tracers, *Reaeration, *Krypton radioisotopes, *Radioactivity techniques, *Dissolved oxygen, Water chemistry, Mixing, Oxygen sag, Aeration, Dispersion, Self-purification, Diffusion, Path of pollutants, Turbulence, Fluorescent dye, Tritium.

Diffusion and dispersion of dissolved oxygen can be studied in the field by tracer techniques. In reaeration and desorption of oxygen and a tracer gas (krypton) from a stream into the atmosphere the driving force is the concentration deficit. The deficit is the difference between the saturated concentration of the gas in the water and the concentration that actually exists. Since the concentration of krypton in the atmosphere is, for all practical purposes, equal to zero, the deficit is simply the concentration in the stream. Direct measurement of dispersion and dilution is not required; a correction is made by using an additional tracer, tritium. Tritiated water is released simultaneously with the krypton-85. Because the tracers are released simultaneously, the dissolved krypton-85 undergoes the same dispersion and dilution as the tritiated water. A fluorescent dye indicates when to sample for the invisible radioactive tracers, and it provides an accurate measure of the time of flow between sampling stations. Samples are taken from the stream as the dye cloud passes, and the concentration of the krypton and tritium is determined by simultaneously counting the activities in a liquid scintillation counter. (See also W73-10337) (Knapp-USGS)
W73-10340

FIELD HYDRAULIC STUDIES,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
J. R. Wallace, and D. E. Hicks.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p43-53, January 1972. 6 fig.

Descriptors: *Reaeration, *Hydraulics, *Water measurement, *Channel morphology, Discharge measurement, Flow rates, Gaging stations, Hydrographs, Streamflow, On-site data collections, Hydrologic data.

The range of the error associated with available mathematical models of stream hydraulics was evaluated to use in developing modifications to existing models for predicting reaeration. Detailed hydraulic studies were made on rivers on which tracer measurements were also conducted. The physical characteristics of interest were the discharge, depth of flow, stream width, flow velocity, hydraulic radius, wetted perimeter, and the slope of the stream. Measurements of hydraulic properties were made at 500 ft intervals. Standard U.S. Geological Survey stream-gaging techniques were used, with slight modifications, to study three streams. The Flint River rises in the southwest part of Atlanta and flows southward. A reach extending from the Flint River sewage treatment plant, located immediately south of the Atlanta Airport, to a point 9.9 miles downstream was selected for study. The South River originates in southwest Atlanta and flows in a southeasterly direction. The portion included in the study extends from the South River sewage treatment plant to a point 18.3 miles downstream. The Patuxent River, Maryland, was also studied. (See also W73-10337) (Knapp-USGS)
W73-10341

LABORATORY PROCEDURES,
R. J. Velten.

In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 55-65, January 1972. 5 fig, 1 tab.

Descriptors: *Tracers, *Krypton radioisotopes, *Tritium, *Radioactivity techniques, Reaeration, Laboratory tests.
Identifiers: *Liquid scintillation counting.

Tritium and krypton are used as tracers in measuring stream reaeration. Because of its extremely low energy, tritium cannot be measured by the usual laboratory counting instruments. Gas counting of the tritium gas as well as liquid scintillation counting as tritiated water are the only useful methods of measurements. Tritium, when used in the determination of reaeration capacity, is in the chemical form of water and hence liquid scintillation counting offers the best choice from the standpoint of ease of sample preparation combined with detector efficiency and background. Krypton-85 can be measured by both beta and gamma counting. However, because of the low gamma abundance, the sensitivity of gamma counting is poor. Liquid scintillation counting is especially suited for measuring both radionuclides simultaneously. Some care must be exercized in the preparation of the samples. Since Kr-85 is an inert gas dissolved in the water, reasonable efforts should be taken to prevent the loss of the gas from solution while preparing the sample for counting. The sample is then placed in the counter. If the counter is equipped with a refrigerated system, counting at 4 deg C is recommended to retard or eliminate any loss of the gas from solution. (See also W73-10337) (Knapp-USGS)
W73-10342

REAERATION CAPACITY OF THE FLINT, SOUTH AND PATUXENT RIVERS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
E. C. Tsivoglou.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 67-82, January 1972. 10 fig.

Descriptors: *Tracers, *Reaeration, *Krypton radioisotopes, *Radioactivity techniques, *Dissolved oxygen, Water chemistry, Mixing, Oxygen sag, Aeration, Dispersion, Self-purification, Diffusion, Path of pollutants, Turbulence.
Identifiers: Flint River (Ga), South River (Ga), Patuxent River (Md).

Reaeration capacity was studied in streams that include a wide range of hydraulic features, to facilitate study of the basic relationships between reaeration and stream hydraulic properties. The Patuxent is a coastal plains stream in Maryland. It receives a highly treated municipal waste at the head of the study section. The Patuxent is characterized by gentle shallow riffles and slow pools, with no waterfalls, rapids or white water. The reaeration studies were conducted at critical low flows and summer temperatures. The South River originates in southwest Atlanta, Ga. The channel is relatively uniform, with typical depths of one to two feet and typical widths of 30 to 40 feet. The bottom is usually sandy. The South River is presently heavily polluted. The Flint also rises in southwest Atlanta and flows generally southward. The study section was about 10 miles long, beginning below the Flint River sewage treatment plant, just south of the Atlanta airport. The stream was heavily polluted during all studies. The channel is made up of alternating riffles and pools. At the upper end there is a violent rapids reach perhaps 50 yards in length and containing several small hydraulic jumps. Below, there are two old mill ponds, each followed in turn by a waterfall 12 feet or so high. (See also W73-10337) (Knapps-USGS)
W73-10343

OXYGEN BALANCE OF THE SOUTH RIVER,
*A. G. Herndon.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 83-87, January 1972. 1 fig, 1 tab.

Descriptors: *Reaeration, *Self-purification, Oxygen sag, Biochemical oxygen demand, Channel morphology, *Georgia, Path of pollutants.
Identifiers: South River (Ga).

The Federal Water Quality Administration, in cooperation with the Georgia Water Quality Control Board, has conducted studies on the South River, Atlanta, Ga., to determine pollution loads and assimilation characteristics. These studies included measurements of dissolved oxygen, BOD, ammonia, and nitrates. Because the flow in the upper end of the South River is only 13 cfs and it receives 13,700 pounds of BOD over a distance of about 15 miles, this river has a heavy pollution load. A very broad range of deoxygenation or BOD reduction rates were found in the South River. Some sections have wide, sandy bottoms and other sections have rocky, turbulent areas. It appears that in some sections of this river the BOD is being removed without requiring an equivalent oxygen demand; or else, additional oxygen is being supplied, other than that of normal reaeration. The general appearance of the stream would indicate that the rocky areas which have sandy, shallow bottoms. (See also W73-10337) (Knapp-USGS)
W73-10344

REAERATION STUDIES OF THE CHATTAHOOCHEE RIVER,
J. R. Wallace.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 89-91, January 1972.

Descriptors: *Tracers, *Reaeration, *Krypton radioisotopes, *Radioactivity techniques, *Dissolved oxygen, Water chemistry, Mixing, Oxygen sag, Aeration, Dispersion, Self-purification, Diffusion, Path of pollutants, Turbulence, *Georgia.
Identifiers: *Chattahoochee River (Ga).

The tracer techniques for measuring reaeration originally developed for small streams were applied to a much larger stream. Flows in the Flint River, Ga., are typically 10 to 20 cubic feet per second; on the South River, Ga., the flows are between 50 to 100 cfs; and on the Chattahoochee River, Ga., flows are around 1000 to 2000 dfs. The hydraulic studies on the Chattahoochee were similar to the hydraulic studies on the Flint and the South. Reaeration coefficients are in the range of 0.01 to 0.04, values which are considerably lower than those reported on the Flint and South. (See also W73-10337) (Knapp-USGS)
W73-10345

MODEL STUDY OF REAERATION CAPACITY OF THE JAMES RIVER ESTUARY (VIRGINIA),
M. W. Lammering.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 93-114, January 1972. 12 fig, 2 tab, 5 ref.

Descriptors: *Hydraulic models, *Reaeration, *Tracers, *Radioactivity techniques, Dissolved oxygen, Krypton radioisotopes, Tritium, Mathematical models, Dye releases, Diffusion, Mixing, Dissolved oxygen, *Virginia.
Identifiers: *James River (Va).

Radio-tracer reaeration studies were conducted in the hydraulic model of the James River estuary. This study was conducted to obtain the reaeration data required for a mathematical model of the estuary. Reaeration rate constants for the prototype were calculated by applying a reduction factor of 1/100th to the model values. The reaeration rate constants were used successfully in a mathematical model of the prototype for oxygen-demanding wastes. The average value of the reaeration constant was 0.069. The use of gaseous krypton-85 for the direct measurement of reaeration capacity was successful. (See also W73-10337) (Knapp-USGS)
W73-10346

FIELD STUDIES IN YAQUINA RIVER ESTUARY OF SURFACE GAS TRANSFER RATES,
D. J. Baumgartner, M. H. Feldman, L. C. Bentsen, and T. L. Cooper.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 115-137, January 1972. 13 fig, 1 tab, 13 ref.

Descriptors: *Tracers, *Reaeration, *Krypton radioisotopes, *Radioactivity techniques, *Dissolved oxygen, Water chemistry, Mixing, Oxygen sag, Aeration, Dispersion, Self-purification, Diffusion, Path of pollutants, Turbulence, Fluorescent dye, Tritium, Estuaries, *Oregon.
Identifiers: Yaquina River (Oreg).

The Yaquina River estuary near Toledo, Oregon, was chosen for a reaeration study because it offers a range of natural conditions necessary for collection of data for completely general application, yet it is small enough for ease of study. Tests under a variety of density distribution conditions may provide data useful for relating gas transfer rates to stream hydrodynamics. Current meters are set in place up-current from the injection point, a vertical profile of salinity and temperature is made, surface current drogues are released, and approximately 400 millicuries each of krypton-85 and tritium water mixed with rhodamine WT and local water are discharged into the center of the stream. Samples are taken until the dye peak has passed. Samples are returned to the lab, transferred to replicate counting vials containing scintillation fluid and each counted twice. (See also W73-10337) (Knapp-USGS)
W73-10347

RADIOLOGICAL SAFETY,
J. P. Longtin.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 139-146, January 1972. 1 fig, 2 tab, 3 ref.

Descriptors: *Radioactivity techniques, *Safety, *Public health, *Tracers, *Reaeration, Krypton radioisotopes, Tritium.

The radiation safety aspects of the double tracer reaeration technique are radiation exposure to the general population in the area of the reaeration study and radiation exposure to the personnel performing the study. Procedures are recommended to minimize radiation exposure to personnel and to the general population. While the total quantity of radioactivity involved in the reaeration measurement technique can be fairly large, the rapid dispersion in the stream coupled with the low relative hazards associated with tritiated water and krypton-85 insure that, with proper planning and execution, the exposures to the general population and to the personnel conducting the study can be kept well below those permitted by the AEC (See also W73-10337) (Knapp-USGS)
W73-10348

EFFECT OF HYDRAULIC PROPERTIES ON REAERATION,
E. L. Thackston.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 147-164, January 1972. 4 fig, 2 tab, 24 ref.

Descriptors: *Reaeration, *Equations, *Hydraulics, Mathematical models, Discharge (Water), Turbulence, Water temperature, Oxygen, Dissolved oxygen, Aeration.

Measurement of the reaeration coefficient by the tracer method is accurate and reliable, but it is also expensive and time-consuming, and it requires highly skilled personnel and a major investment in instrumentation. Most organizations interested in obtaining reaeration coefficients cannot justify this investment. However, many times basic hydraulic data (discharge, depth, slope, velocity, temperature) are available for the reach of stream in question, or they can be obtained for less expenditure than a tracer test would require. It is possible that acceptably accurate average values of the hydraulic data could be obtained with significantly fewer measurements. With these data a mathematical model may be used for prediction of the reaeration coefficient. Methods used to predict reaeration are reviewed. The Thackston-Krenkel equation is slightly more accurate than any of the others. All the equations apply to fully developed turbulent shear flow with a regular vertical velocity profile and do not apply to laminar flow. (See also W73-10337) (Knapp-USGS)
W73-10349

POLLUTANT EFFECTS ON REAERATION,
L. A. Neal.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlnta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 165-177, January 1972. 4 fig, 3 tab, 5 ref.

Descriptors: *Reaeration, Water pollution effects, *Alkylbenzene sulfonates, Laboratory tests, Self-purification, Rivers, *Georgia, Water chemistry, Detergents.
Identifiers: *Chattahoochee River (Ga).

Some pollutants can alter the reaeration capacity of a stream. In order to measure the effect of pollutants on the gas transfer rate coefficient, an open top reactor was constructed. Each pollutant effect test consisted of two reactor runs. The first run was conducted on clean water and a krypton-85 transfer rate determined. The second run was conducted on the polluted sample under conditions identical to those of the clean water run. The reaeration rate is significantly reduced by the surface active agent, LAS. The reaeration rates in the highly polluted reaches of the South and Chattahoochee Rivers, Georgia, are lower than they would be in the absence of pollution. (See also W73-10337) (Knapp-USGS)
W73-10350

OBSERVED VS. CALCULATED REAERATION CAPACITIES OF SEVERAL STREAMS,
J. R. Wallace.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 179-183, January 1972. 1 fig, 1 tab.

Descriptors: *Reaeration, *Hydraulics, *Water measurement, *Channel morphology, Discharge measurement, Flow rates, Gaging stations, Hydrographs, Streamflow, On-site data collections, Hydrologic data .

Measured reaeration values and values computed from several of the formulas that are available are compared. In the equations, three different parameters used are depth, velocity, and slope. The velocity used in these equations is simply the length of the reach divided by the time of passage as measured from dye studies. The depth flow is the average of the average depth at each cross section. Slope is the difference in elevation at the upstream and downstream end of the reach divided by the length. Mathematical models provide predictions that are closer to the observed reaeration values than values from prediction equations in uniform reaches. The equations, to some extent, are based upon assumptions about the uniformity of the channel and on the assumption of unbroken surfaces. (See also W73-10337) (Knapp-USGS)
W73-10351

RELATIONSHIPS BETWEEN HYDRAULIC PROPERTIES AND REAERATION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-10352

STUDY OF THE OCEANOGRAPHIC CONDITIONS IN THE RIA DE AROSA, IN SUMMER, (IN SPANISH),
Spanish Inst. of Oceanography, Madrid.
For primary bibliographic entry see Field 02L.
W73-10363

POLLUTION AND DEGRADATION OF SOILS: A SURVEY OF PROBLEMS,
State Coll. of Agronomical Science, Gembloux (Belgium).
G. Manil.
Ann Gembloux, Vol 77, No 3, p 175-182, 1971.
Identifiers: *Degradation, *Soil properties, Surveys, Water pollution sources.

This is the first paper of a conference program on pollution of soils. Certain laws which govern the properties of soils are outlined, such as the specific rhythm, the biodynamic character indicating the state of fertility, and the specific behavior. In the latter case physical functions (heat, water and air capacity), chemical functions (e.g., nutritive elements), physicochemical functions (acidity, oxidation, reduction potential), and regulatory functions of the biochemistry are to be considered. Pollution is the endogenous or exogenous incorporation of deleterious substances into the soil. Changes in the acidity may lead to increase in the edaphic milieu of Al+++, toxic to non-acidophilic plants. Pesticides, antiparasitic material, growth control substances and radioactive fallout are examples of exogenous pollution.--Copyright 1972, Biological Abstracts, Inc.
W73-10384

A CONTRIBUTION TO THE CHEMICAL AND MICROBIOLOGICAL STUDY OF WATER--CATCHMENT SYSTEMS IN CONNECTION WITH DECREASED YIELD DURING OPERATION, (IN SERBO CROATIAN),
For primary bibliographic entry see Field 05C.
W73-10386

THE UTILIZATION AND CONSUMPTION OF MERCURY IN FRANCE: OUTLINE OF THE RESULTING HEALTH PROBLEMS, (IN FRENCH),
Laboratoire Central de Recherches Veterinaires, Alfort (France).
G. Cumont.
Recueil Med Vet Ec Alfort. Vol 148, No 4, p 427-442. 1972. English summary.
Identifiers: Air pollution, Food contamination, *France, *Health aspects, Mercury, Pollution, Soils, Water pollution sources, Industrial wastes.

The pollution of the air, water, soil and food by increasing quantities of Hg is alarming. This pollution stems from industrial wastes and agricultural use. Highly industrialized countries should take measures to reduce these pollution sources.--Copyright 1972, Biological Abstracts, Inc.
W73-10389

PHENOL-AND RHODANE DESTRUCTING MICROFLORA AS A FACTOR FOR NATURAL PURIFICATION OF THE DNIEPER RESERVOIRS, (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Universitet (USSR).
For primary bibliographic entry see Field 05C.
W73-10394

5C. Effects of Pollution

STUDIES ON BENTHIC NEMATODE ECOLOGY IN A SMALL FRESHWATER POND,
Auburn Univ., Ala. Dept. of Botany and Microbiology.
For primary bibliographic entry see Field 05A.
W73-09751

A CRITICAL TEST OF METHODS FOR ISOLATION OF VIRUSES FOR USE IN CONTROL OF NUISANCE ALGAE,
Illinois Univ., Chicago. Dept. of Biological Sciences.
For primary bibliographic entry see Field 05A.
W73-09753

NUTRIENT TRANSPORT BY SEDIMENT--WATER INTERACTION,
Illinois Univ., Chicago. Dept. of Materials Engineering.
C. A. Moore, and M. L. Silver.
Available from the National Technical Information Service as PB-220 682 $3.00 in paper copy, $0.95 in microfiche. Illinois Water Resources Center, Urbana, Research Report No 65, April 1973. 51 p, 12 fig, 1 tab. OWRR A-053-ILL (2). 14-31-0001-3213.

Descriptors: *Eutrophication, *Lake beds, *Phosphates, Great lakes, *Nutrients, *Sediment-water interfaces, Water pollution effects, Mathematical models, Laboratory tests, Analytical techniques.
Identifiers: P-32 techniques, Phosphate-sediment exchange.

This report presents the results of a series of laboratory tests to investigate phosphate transport in sediments subjected to one dimensional consolidation type loading. P-32 techniques are employed. The results indicate that measurable transport occurs for phosphate concentrations on the order of 2 mg p/gm dry soil or more and for loads

in excess of the preconsolidated load for the samples. In addition, the report discusses models for the exchange of phosphates between sediment or soil in lakes and lake waters. These models are expressed in a form that allows them to be used to predict the environmental impact of construction operations in aquatic environments. Three modes of interaction are discussed: (1) exchange due to new soil surfaces beign exposed, (2) exchange due to the dispersion of soil particles in the water, and (3) release due to forced drainage of water from sediments. The conditions under which each mechanism might be influential are discussed and mathematical models are developed for quantitative predictions.
W73-09754

CLADOPHORA AS RELATED TO POLLUTION AND EUTROPHICATION IN WESTERN LAKE ERIE,
Ohio State Univ., Columbus. Dept. of Botany.
C. E. Taft, and W. J. Kishler.
Available from National Technical Information Service as PB-220 684, $3.00 in paper copy $0.95 in microfiche. Ohio Water Resources Center, Columbus, Completion Report 332x, 339x, January 1973. 103 p, 15 fig, 20 tab, 277 ref. OWRR A-007-OHIO (1) and A-017-OHIO (1). 14-01-0001-1855.

Descriptors: *Cladophora, *Lake Erie, *Eutrophication, Freshwater Algae, *Chlorophyta, *Sessile algae, *Photosynthesis, Fisheries, Water pollution sources, Drainage programs, Pioneer stage, Sediments, *Oxygenation, Water chemistry nuisance algae, Limnology, Streams, Recreation, Carp, Crustaceans, Ohio.

Little has been said about the role of Cladophora in the ecosystem. Some feel it is a new-comer and portends increased pollution in western Lake Erie; others, while not certain, believe it entered the lake behind the retreating glacier. Excerpts from early historical records permit a comparison of conditions in Lake Erie over one hundred years ago with those of today. Large amounts of silt and black mud injected over the past century have changed the bottom topography and has been accompanied by the disappearance of rooted aquatics. Cladophora reportedly increased during the late 1940's with decomposing algal blooms and the Detroit River being major nutrient sources. The alga extends from a few feet above water level to several feet below along shelving rocks and reefs. Its growth is controlled by light penetration which in turn is controlled by a gradually rising floc capacity of resuspended bottom, and by water temperatures below 40 deg F and above 65 deg F. Quantitative data are based on dry weights of Cladophora from known areas measured by chain samples. The data indicate that Cladophora survives on hard substrate from a formerly mature ecosystem, and that nutrient input into western Lake Erie is not a first-order limiter. Furthermore Cladophora's real contribution of oxygen and as a cover and nursery for microscopic and near-microscopic fish food organisms must be weighed against its nusiance value on beaches. A bibliography of 185 Cladophora citations and 92 general references accompany 15 figures and 20 tables that present pertinent data.
W73-09757

AIR INJECTION AT LAKE CACHUMA, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
For primary bibliographic entry see Field 05G.
W73-09799

LIMNOLOGY OF DELTA EXPANSES OF LAKE BAYKAL (LIMNOLOGIYA PRIDEL'TOVYKH PROSTRANSTV BAYKALA).
For primary bibliographic entry see Field 02H.
W73-09806

RATIO OF ORGANIC AND MINERAL COMPONENTS OF THE SOUTH BAIKAL SUSPENDED WATERS (IN RUSSIAN),
For primary bibliographic entry see Field 05B.
W73-09812

SOME EFFECTS OF A POWER PLANT ON MARINE MICROBIOTA,
Florida Univ., Gainesville. Dept. of Environmental Engineering Sciences.
J. L. Fox, and M. S. Moyer.
Chesapeake Science, Vol 14, No 1, p 1-10, March 1973. 15 fig, 1 tab, 12 ref.

Descriptors: *Electric power production, *Environmental effects, *Heated water, Marine microorganisms, Analytical techniques, Evaluation, Discharge (Water), Effluents, Water cooling, Temperature, Toxicity, *Florida, Sampling, On-site-tests, Thermal powerplants, Thermal pollution, Water pollution effects, *Biota.

Various analytical methods, including primary productivity, chlorophyll a, adenosine triphosphate (ATP), bacterial counts, total and dissolved solids, temperature and dissolved oxygen were used to evaluate the direct and indirect effects of power plant cooling water on marine microbiota. Both 'shock' effects and changes occurring as organisms remained exposed to the warmer effluent were determined by following and sampling the heated water as it flowed out the discharge canal. The results showed that increased water temperature is having an effect on the marine organisms present. Effects are most profound immediately following heat exposure and their severity seems to be proportional to the temperature of the intake water. Primary productivity dropped an average of 25.9 percent. ATP and bacterial populations generally increased. Chlorophyll a showed wide fluctuations. The results showed that some organisms, such as phytoplankton, may be killed (or at least hindered in their ability to assimilate carbon) whereas other organisms, such as bacteria, survive condenser tube passage and may even increase in numbers as a result of prolonged exposure to increased heat. (Jerome-Vanderbilt)
W73-09845

SWIMMING PERFORMANCE OF THREE WARMWATER FISHES EXPOSED TO A RAPID TEMPERATURE CHANGE,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
C. H. Hocutt.
Chesapeake Science, Vol 14, No 1, p 11-16, March 1973. 4 fig, 2 tab, 21 ref.

Descriptors: *Heated water, Discharges (Water), *Fish migration, Fish, Biology, Thermal powerplants, *Thermal pollution, Effluents, Flow, Environmental effects, Metabolism, Bass, Channel catfish, Shiners, Laboratory tests, *Water temperature, *Pennsylvania, *Susquehanna River.
Identifiers: *Fish (Swimming habits), *Conowingo Reservoir (Penn).

The influence of rapid temperature change on the swimming performance of some warmwater fishes common to Conowingo Reservoir, Susquehanna River, Pennsylvania was tested. Largemouth bass (Micropterus Salmoides), spotfin shiner (Notropis spilopterus), and channel catfish (Ictalurus punctatus) were acclimated to temperatures ranging from 15 to 35 C at 5 C intervals for 14 to 20 hours. For a given test, a single specimen was dipped out of the holding tank and placed in the respirometer. After a conditioning period to accustom the fish to the current flow, the velocity of the current was gradually increased. Results of 55 tests are reported. The largemouth bass remained tranquil upon introduction to the respirometer and proved to be a consistant swimmer. The spotfin shiners were excitable in the test chamber and maximum swimming speed was decidedly higher than for the bass or the catfish. As with the bass and the shiner the catfish swimming performance increased with temperature, from 15 to 30 C, but decreased thereafter. It is felt that the methods presented simulate conditions near industrial discharges where temperature gradients may occur. (Jerome - Vanderbilt)
W73-09846

THERMAL EFFECTS OF PROJECTED POWER GROWTH: SOUTH ATLANTIC AND EAST GULF COAST RIVER BASINS,
Hanford Engineering Development Lab., Richland, Wash.
S. L. Engstrom, G. F. Bailey, P. M. Schrotke, and D. E. Peterson.
Report HEDL TME 72-131, November 1972. 157 p, 76 fig, 26 tab, 30 ref, 3 append. AEC-AT (45-1)-2170.

Descriptors: *Electric power production, *Heated water, *Thermal pollution, *River basins, Thermal powerplants, Discharge (Water), Heat flow, Heat transfer, Cooling water, Waste water, Forecasting, *Southeast U.S., River flow, Standards, Regulation, Temperature.

The direct cooling capacities of twelve major southeastern river systems were calculated for average and low flow conditions. Total regional cooling capacities considering not only the direct heating of the rivers, but also their ability to dissipate heat to the atmosphere, ranged from a high of 328 GW (T) to a low of 65 GW (T). The Alabama, Apalochicola, Altamaha and Savannah rivers contribute essentially all of the capacity based on low flow conditions. Considering that roughly 1.7 MW (T) are rejected regionally for each MWe generated, the available cooling capacity will support the equivalent of 38 GWe at one time. A projection estimates that approximately 65 GWe could be accommodated in this area. Although improvements in plant efficiency could increase this to 70 or 80 GWe, analysis of projected power generation patterns indicates that this is insufficient to cool, on a once through basis, the anticipated growth in the electrical generation industry. Recourse to supplemental cooling techniques will be required throughout much of the Southeastern United States. Jerome - Vanderbilt)
W73-09848

THE EFFECT OF TEMPERATURE ON THE RESPIRATORY FUNCTION OF COELACANTH BLOOD,
Bristol Univ. (England). Research Unit for Comparative Animal Respiration.
G. M. Hughes, and Y. Itazawa.
Experientia, Vol 28, No 10, p 1247, October 15, 1972. 1 fig, 11 ref.

Descriptors: Fish, *Respiration, Oxygen, *Laboratory tests, Biochemistry, Chemical analysis, *Fish physiology, Metabolism, *Temperature, Environmental effects.
Identifiers: *Coelacanth blood, *Oxygen content analyzer, *Latimeria chalumnae.

This study used samples of blood from Latimeria chalumnae caught at Anjouan in January and Iconi, Grande Comore in March 1972, in order to investigate the oxygen content of coelacanth blood equilibrated with various gas mixtures at temperatures of 28C and 15C. The analysis was performed with a Lex Oxygen Content analyzer. The blood showed a lower affinity for oxygen at 28C than at 15C. The pH is also lower at higher temperatures. These results show agreement with results obtained from other species of fish. Differing oxygen affinity of the blood may explain some survival differences of specimens. (Jerome-Vanderbilt)
W73-09856

TEMPERATURE ADAPTATION OF EMBRYONIC DEVELOPMENT RATE AMONG FROGS,
Dalhousie Univ., Halifax (Nova Scotia). Dept. of Biology.
I. A. McLaren, and J. M. Cooley.
Physiological Zoology, Vol 45, No 3, p 223-228, 1972. 3 fig, 1 tab, 20 ref.

Descriptors: *Adaptation, *Growth rates, *Frogs, *Embryonic growth stage, *Mathematical studies, Biology, Physiology, Amphibians, Environmental effects, *Temperature, Analytical techniques, Evaluation, Measurements, Estimating.

Analysis of temperature adaptation of Rana pipiens is extended in this study to available data on the genus Rana in North America, Europe and Japan. Where the relationship between development rate and temperature is monotonic and slightly curvilinear within natural temperature ranges, it may well be described by Belehradek's temperature function. This function was applied to data from the literature on the effects of temperature on the development rate of embryos of Rana spp. between first cleavage and beginning of gill circulation. Development rates at temperatures which produced abnormalities or death of more than 50% of the embryos have been excluded. Rates for 14 species of Rana are presented. It is suggested that more precise measurement of temperatures at spawning might lead to an even closer correlation of the relationships between various species. It is concluded that deeper inquiry into the biological meaning of the parameters of Belehradek's temperature function holds promise of useful analytical and predictive tools for ecologists. (Jerome-Vanderbilt)
W73-09858

METABOLIC RATE INDEPENDENT OF TEMPERATURE IN MOLLUSC TISSUE,
Memorial Univ. of Newfoundland, St. John's. Marine Sciences Research Lab.
J. A. Percy, and F. A. Aldrich.
Nature, Vol 231, No 5303, p 393-394, June 11, 1971. 2 fig, 1 tab, 8 ref.

Descriptors: *Temperature, *Oysters, *Animal metabolism, Respiration, Animal behavior, Aniaml physiology, *Seasonal, Invertebrates.
Identifiers: Bivalves.

There is considerable controversy about the possible occurrence of temperature--insensitive regions in poikilotherm rate-temperature (R-T) curves. Investigations of seasonal shifts of metabolism in excised tissues of the American oyster yielded results that support the concept of temperature-independent metabolism on a tissue level homeostatic mechanism. The adaptive significance of the temperature independent respiration of the muscle tissue may be related to the fact that the adductor muscle is one of the principal defensive mechanisms of the bivalves and as such, should ideally be relatively independent of environmental fluctuations. (Oleszkiewicz-Vanderbilt)
W73-09863

EFFECTS OF TEMPERATURE AND SALINITY ON THERMAL DEATH IN POSTLARVAL BROWN SHRIMP, PENAEUS AZTECUS,
Galveston Marine Lab., Tex.
L. M. Wiesepape, D. V. Aldrich, and K. Strawn.
Physiological Zoology, Vol 45, No 1, p 22-23, 1972. 4 fig, 1 tab, 27 ref. NSF Grant GH-59.

Descriptors: *Aquiculture, *Shrimp, *Heat resistance, *Salinity, *Thermal pollution, Biology, Animal physiology, Aquatic animals, Temperature, Mortality, Growth stages, Environmental effects, Testing, Electric power production, Thermal powerplants, *Texas, *Gulf of Mexico.

Interest has been expressed in the possibilities of commercial mariculture of brown shrimp which naturally occur in bays in the Northwest Gulf of Mexico. The lethal temperature for shrimp acclimated at the same salinity and different temperatures was determined. The thermal resistance of postlarvae transferred to a higher temperature with two salinities was measured at timed intervals to determine differences in acclimation. To determine the effects of changes in temperature and salinity at the same time, a large number of postlarval shrimp acclimated at various temperature-salinity combinations were subjected to various other temperature-salinity conditions. The level of thermal resistance does not seem to be affected by reduced salinity. It now seems possible to raise brown shrimp from the egg to the postlarval stage under hatchery conditions. The effects of heated effluents on postlarval brown shrimp depend primarily on the temperature of the effluent and the temperature at which the shrimp are acclimated. Secondary considerations are salinity and acclimation salinity. (Jerome-Vanderbilt)
W73-09866

EFFECTS OF INDUSTRIAL EFFLUENTS ON PRIMARY PHYTOPLANKTON INDICATORS,
Christian Bros. Coll., Memphis, Tenn.
R. J. Staub, J. W. Appling, and J. Haas.
Available from the National Technical Information Service as PB-220 741, $3.00 in paper copy, $0.95 in microfiche. Tennessee Water Resources Research Center, Knoxville, Research Report No 26, April 1973. 19 p, 5 tab, 6 ref. OWRR B-011-TENN (1) 14-31-001-3334.

Descriptors: *Phytoplankton, *Effluents, Pollution, *Eutrophication, Chromium, Copper, Fluoride, Iron, Manganese, Mercury, Salt, Diatoms, *Tennessee, *Mississippi River, *Chlamydomonas, Scenedesmus, Industrial wastes, Hydrogen ion concentration, Waste dilution, Metals, Water pollution effects.
Identifiers: *Memphis (Tenn.), Cyclotella, Fragilaria, Melosira, Navicula, Synedra, EDTA.

A method is presented whereby an industry can evaluate its effluent and decide whether it (1) is suitable for emptying into the public waterways, (2) can be made satisfactory merely by adjusting the pH, (3) can be made satisfactory merely by adjusting the pH and reasonable dilution with water, or (4) is unsatisfactory and can be made suitable only by some special treatment. Cultured phytoplankton are inoculated into a series of flasks containing varying amounts of effluent mixed with nutrient medium; the amount of growth after two weeks is recorded and interpreted. A suitable or properly treated effluent is one which will support the growth of representative genera of tolerant phytoplankton, previously isolated from local waterways, without leading to rapid eutrophication. Examples of all four cases were found in the effluent samples tested. Data are presented on tolerance levels of a few local algae to some metallic and other ions.
W73-09873

POLLUTION RELATED STRUCTURAL AND FUNCTIONAL CHANGES IN AQUATIC COMMUNITIES WITH EMPHASIS ON FRESHWATER ALGAE AND PROTOZOA,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
J. Cairns, Jr., G. R. Lanza, and B. C. Parker.
Proceedings of the Academy of Natural Sciences of Philadelphia, Vol 124, No 5, p 79-127, December 29, 1972. 9 fig, 4 tab, 237 ref.

Descriptors: Water pollution effects, Assessments, *Monitoring, *Aquatic algae, Aquatic environment, *Bioassay, *Bibliographies, *Protozoa.
Identifiers: *Microbial bioassays, Environmental impact, Diversity indices.

Past and present approaches to microbial assessment of water pollution are discussed particularly the uses of algal and protozoan community structure and function to assay pollution. Types of pollution and their potential effect on algal and protozoan community structure and function are discussed under 11 different headings: Organic Pollution, Nitrogen, Phosphorus, Roles of Nitrogen and Phosphorus in Eutrophication, Importance of Available Carbon, Other Nutrients, Interactions of Ions and Other Factors, Culture Studies on Nutrient Requirements and Metabolism of Protozoa, Vitamins and Other Organic Requirements, TemperatureEffects on Community Structure and Function, and Toxic Substances.
W73-09875

SUPPOSED TOXICITIES OF MARINE SEDIMENTS. BENEFICIAL EFFECTS OF DREDGING TURBIDITY,
Resources and Ecology Projects, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 05G.
W73-09880

FACTORS CAUSING ENVIRONMENTAL CHANGES AFTER AN OIL SPILL,
University of Southern California, Los Angeles.
D. Straughan.
Journal of Petroleum Technology, p 250-254, March 1972. 1 tab, 29 ref.

Descriptors: Oil, *Oil spills, *Environmental effects, Marine plants, Marine animals, *On-site investigations, Forecasting, Water pollutant effects.
Identifiers: Biological impact, *Environmental factors, Oil pollution control.

Factors which govern the biological impact of an oil spill are discussed. Nine categories of factors are proposed: (1) the type of oil spilled, (2) the dose of oil, (3) the physiography of the area of the spill, (4) weather conditions at the time of spill, (5) the biota of the area, (6) the season of the spill, (7) previous exposure of the area to oil, (8) exposure to other pollutants, and (9) the treatment of the spill. Since any of the areas may interact with another, the environmental impact of an oil spill can only be predicted in a general way. The type of oil spilled is probably the single most important factor; thin, brown oil is the most toxic. Various oil spill disasters, such as the one occurring in Santa Barbara, Torrey Canyon and Tampico Maru are reviewed within the framework of the nine categories. The psychological perspective of a spill observed is also important. The optimist searches for signs of recovery, the pessimist concentrates on the damage done. (Ensign-PAI)
W73-09885

SLUDGE DUMPING AND BENTHIC COMMUNITIES,
Bordeaux Univ., Arcachon (France). Inst. of Marine Biology.
I. R. Jenkinson.
Marine Pollution Bulletin, Vol 3, No 7, p 102-105, July 1972. 2 fig, 1 tab, 16 ref.

Descriptors: *Coasts, *Waste dumps, *Waste disposal, *Sewage sludge, Water pollution, Aquatic life, Environmental effects.
Identifiers: *Needles Spoil Ground (U.K.), *Dumping.

A survey of existing conditions in dumping areas off the south coast of England was conducted. The properties and immediate fate of sewage sludge dumped near the Southampton-Portsmouth region were examined; the ways in which dumping has affected the fauna of the Needles Spoil Ground were also investigated. Laboratory and field tests were undertaken. Despite settling out by the sludge, neither the presence nor the absence of any species could be attributed to the dumping. However, further study is necessary before it can be stated

with certainty whether the current rate of dumping is without deleterious effect. (Ensing-PAI)
W73-09887

BACTERIAL POLLLUTION OF THE BRISTOL CHANNEL,
Bristol Univ. (England). Dept. of Bacteriology.
G. C. Ware, A. E. Anson, and Y. F. Arianayagam.
Marine Pollution Bulletin, Vol 3, No 6, p 88-90, June 1972. 2 fig, 7 ref.

Descriptors: *Industrial wastes, *Channels, *Sampling, *Aerobic bacteria, Computer models, Water circulation, Water pollution effects, *Coliforms.
Identifiers: *Bristol Channel (UK), Population density.

The effects of industrial and urban effluents on the marine and estuarine environment of the Bristol Channel, England, were investigated. Over 150 samples of water were collected from various points in the Channel. Total aerobic organisms found in the samples ranged from 10/ml to 5.8 x 10,000/ml, depending somewhat upon the area of the Channel from which the samples were drawn. The overall movement of the water in Bristol Channel was also investigated; the midstream surface water body was found to have a general easterly movement. A computer program was developed to help estimate the water movement as well as to predict sampling locations at standard tide height. Bacterial organisms are either surviving longer than normal (coliform bacteria normally die in a matter of hours when exposed to salt water) or actually multiplying in the Channel. (Ensign-PAI)
W73-09889

STRESSED CORAL REEF CRABS IN HAWAII,
Naval Biomedical Research Lab., Oakland, Calif.
L. H. DiSalvo.
Marine Pollution Bulletin, Vol 3, No 6, p 90-91, June 1972. 1 fig, 8 ref.

Descriptors: Marine animals, *Stress, *Crabs, *Sedimentation, *Sewage, Water pollution effects, Animal physiology, Environmental effects, *Hawaii, Coral.
Identifiers: *Kaneohe Bay (Hawaii), Shell distress, Encrustation, *Chitinoclastic bacteria.

A brief account of shell distress in several species of xanthid crabs inhabiting coral reefs in Kaneohe Bay, Hawaii, is presented. The crabs exhibited several kinds of defects, including encrustation by sessile organisms, shell disease (pitting) and overt physical damages (cracks, holes). Heavy sedimentation and the presence of numerous chitinoclastic bacteria in the Bay sediments probably promoted shell disease among the crabs living inshore. Pitting is believed to arise from microzonation of the distribution of chitinoclastic bacteria in the bacterial flora of the shell. The overt physical damage of the crabs observed is probably the result of encounters with stomatopod crustaceans. It is concluded that the recruitment of juveniles produced in clean reef habitats could provide for replacement of stressed inshore stocks of xanthid crabs. (Ensign-PAI)
W73-09890

MERCURY IN SEA-FOOD FROM THE COAST OFF BOMBAY,
Tata Inst. of Fundamental Research, Bombay (India).
B. L. K. Somayajulu.
Current Science, Vol 41, No 6, p 207-208, March 20, 1972. 2 tab, 13 ref.

Descriptors: *Coasts, *Mercury, Marine animals, *Toxicity, Laboratory tests, Water pollution, Water quality standards, Water pollution effects, Neutron activation analysis.
Identifiers: *Bombay (India), *Seafood, Beta-gamma counting.

Specimens of common seafood, including lobster, pomfret, Bombay duck and prawns were collected off the coast of Bombay, India, and analyzed for mercury content. Neutron activation and beta-gamma coincidence counting were used to measure the mercury levels in the samples. The results of the testing indicate a mercury concentration of about 100 ppb for all analyzed organisms, except salmon, which evidenced higher levels. The upper limit of mercury allowed by U.S. Food and Drug Administration is 500 ppb; the samples all fell considerably below that limit. Preliminary evaluations must be augmented by further research before conclusive statements on mercury pollution can be made. (Ensign-PAI)
W73-09891

PROBLEMS OF THE CASPIAN,
V. Rich.
Marine Pollution Bulletin, Vol 3, No 6, p 84-85, June, 1972. 7 ref.

Descriptors: Sea water, *Water level, *Salinity, Water pollutant ion effects, *Industrial effluents, Fisheries, Water pollution control, Environmental control, *Exploitation.
Identifiers: *Caspian Sea, Environmental protection.

The problems caused by pollution in the waters of the Caspian Sea are briefly discussed. The hazards of a falling water level and increasing salinity have been further complicated by off-shore oil drilling and pollution from transport ships and fishing fleets. The Soviet Union has been attempting to alleviate some of these problems by diverting water from the Siberian rivers (via canal) towards the Caspian. Anti-pollution controls have been instigated to cut down on the amount of petroleum products, phenols, copper, zinc and untreated sewage which are carried to the Sea by feeder rivers. The construction of a new water purification plant at the West Caspian oil center of Neftyanye Kamni is also proposed. The system will be designed to deal with oil leakage and wastes and also discharges from bilges and storm damaged tankers. These plans, and other less ambitious ones, suggest that the ecological importance of the Caspian is at last taking precedence over its geological significance. (Ensign-PAI)
W73-09896

INDIGENOUS AND PETROLEUM-DERIVED HYDROCARBONS IN A POLLUTED SEDIMENT,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05A.
W73-09898

MERCURY IN FUR SEALS,
National Marine Fisheries Service, Seattle, Wash.
Marine Mammal Biological Lab.
For primary bibliographic entry see Field 05A.
W73-09901

ACUTE TOXICITY OF POLYOXYETHYLENE ESTERS AND POLYOXYETHYLENE ETHERS TO S. SALAR AND G. OCEANICUS,
Fisheries Research Board of Canada, St. Andrews (New Brunswick). Biological Station.
D. J. Wildish.
Water Research, Vol 6, p 759-762, 1972. 2 fig, 1 tab, 5 ref.

Descriptors: *Surfactants, *Toxicity, Aquatic animals, Water pollution effects.
Identifiers: *Salmo salar, *Gammarus oceanicus, *Polyoxyethylene esters, *Polyoxyethylene ethers, Ethylene oxide groups.

Results show a close linear relationship between the degree of polymerization of the polyoxyethylenic chain and toxicity. The fewer ethylene oxide groups per molecule, the greater the toxicity. The data also showed that polyoxyethylene ethers are generally more toxic. S. salar polyoxyethylene (4) lauryl ether is 9 times more toxic at the incipient lethal levels (ILL), than polyoxyethylene (14) monolaurate, and in G. oceanicus polyoxyethylene (4) lauryl ether is 4000-14,000 times more toxic at the 96-h LC50 than polyoxyethylene esters. This difference may be due to the relative ease of cleavage of the ester linkage by lipid metabolizing enzymes in comparison with the more resistant ether linkage. No significant mortality occurred in controls of either species and any mortality that did occur was probably due to the effects of the nonionic surfactants. (Ensign-PAI)
W73-09906

FURTHER INVESTIGATIONS OF THE TRANSFER OF BOMB 14C TO MAN,
Scottish Research Reactor Centre, Glasgow (Scotland). Radiocarbon Unit.
For primary bibliographic entry see Field 05B.
W73-09908

THE KENT COAST IN 1971,
British Museum of Natural History, London. Marine Algal Section.
I. Tittley.
Marine Pollution Bulletin, London, Vol 3, No 9, p 135-138, September 1972. 2 tab, 15 ref.

Descriptors: *Coasts, *Estuaries, Water pollution, *Oil wastes, Oil, Accidents, Ships, Cleaning, *Detergents, Water pollution effects, *Aquatic populations, Marine animals, Vegetation.
Identifiers: *United Kingdom (Kent coast), Thames river estuary.

Oil pollution due to accidental and/or unknown causes during 1971 on the Kent coast of the United Kingdom is reviewed. Three major oil tanker accidents that produced heavy bouts of pollution by oil and detergent along 100 km of Kent coast are described in regard to their effect on the flora and fauna. The methods used in clearing the oil slicks from sea and shore are described as well as the detrimental effects of the detergents used. Other minor oil pollution incidents, some of them of unknown causes are analyzed. The fact that a recovery of biological activity (algae and fish) has been observed in some portions of the Thames river estuary that were previously completely deserted is interpreted as a sign of the overall improvement in the state of the river water. (Ensign-PAI)
W73-09909

PETROLEUM,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05A.
W73-09917

INORGANIC CHEMICALS,
Goeteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W73-09918

ORGANIC CHEMICALS,
Stockholm Univ. (Sweden). Institutionen for Analytisk Kemi.
For primary bibliographic entry see Field 05A.
W73-09919

TEST, MONITORING AND INDICATOR ORGANISMS,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Lab.

For primary bibliographic entry see Field 05A.
W73-09923

DANGERS OF MERCURY AND ITS COMPOUNDS,.

Vet Ital. Vol 22, No 11/12, p 715-721. 1971.
Identifiers: Contamination, Ecological effects, *Mercury, Mercurials, Reviews.

Ecological contamination and the biological aspects of inorganic and organic mercurials were reviewed and discussed.--Copyright 1973, Biological Abstracts, Inc.
W73-09988

SOME METAL TRACE ELEMENTS IN THE BLOOD OF PATIENTS WITH ENDEMIC FLUOROSIS, (IN RUSSIAN),
V. I. Nikolaev, V. I. Sidorkin, and K. G. Kas'yanova.
Vestn Akad Med Nauk SSSR. Vol 26, No 10, p 77-80. 1971. Illus. English summary.
Identifiers: Barium, Blood, Cobalt, Cobaltemia, *Flurosis (Endemic), Hyper cobaltemia, *Metals, Nickel, *Trace elements, USSR, Zinc.

The Co, Ni, Zn and Ba blood content was determined by spectral analysis in patients with endemic fluorosis and in healthy residents of 3 settlements in the Apsheron peninsula, USSR, where the water of native sources contains fluorine. Fluorosis-afflicted patients had a markedly elevated absolute and relative Ba and Ni concentration in their blood, along with a drop of the Zn level. Some patients suffered from hypercobaltemia.--Copyright 1973, Biological Abstracts, Inc.
W73-09989

EFFECTS OF FLUORINE IN CATTLE: A SUMMARY OF RESULTS OF STUDIES OVER A NUMBER OF YEARS IN THE NEIGHBORHOOD OF A HYDROFLUORIC ACID FACTORY AND AN ALUMINUM FACTORY (IN GERMAN),
Tieraerztlichen Hochschule, Hanover (West Germany).
H-D. Gruender.
Zentralbl Veterinaermed Reihe A, Vol 19, No 4, p 265-309, 1972, Illus, English summary.
Identifiers: Aluminum, *Cattle, Fluoric-acid, *Fluorine, Hydrofluoric acid, *Air pollution effects, Industrial wastes (Air).

Pollution of the air brought about by civilization in centuries of industrial expansion produces a serious danger for plants, animals and man. The natural F2 content of soil, surface water and air in the inhabited areas of the earth is continually increasing as a result of F produced by an almost all combustion process. In addition to certain organic F compounds with a high toxicity for mammals, damage can also result from the erosive effect of free hydrofluoric acid or from acute or chronic increased absorption of F ions. In cattle, a species particularly susceptible to F2, various forms of chronic absorptive fluoride poisoning occur (geofluorosis, alimentary fluorosis, hydrofluorosis, industrial fluorosis) which result from increased uptake of F2 accumulating over periods of mo. or yr in the hard tissues of the body, a distinction can be made between fluorosis of the teeth without loss of production (tolerance dose) and teeth and/or bone fluorosis with reduced production (toxic dose). Studies were carried out between 1962 and 1967 in the area near a factory producing hydrofluoric acid and another producing Al. The studies involved a total of 36 cattle kept under control conditions on 2 farms. In relation to the early recognition, reduction and prevention of the damage caused by fluorosis, various important factors are considered which influence the occurrence and extent of F effects in cattle kept under ordinary conditions of management and feeding. Attention was also paid to the regression of damage caused by fluorosis outside this area. Damage in cattle can be largely prevented by paying sufficient attention to the various factors related to the way in which animals are housed, managed and fed.--Copyright 1973, Biological Abstracts, Inc.
W73-09991

THE DISTRIBUTION OF CHITIN- AND N--ACETYLGLUCOSA-MINE-DECOMPOSING BACTERIA IN AQUATIC ENVIRONMENTS,
Kagawa Univ., Takamatsu (Japan). Dept. of Food Science.
For primary bibliographic entry see Field 05B.
W73-10010

ECOLOGY OF A EUTROPHIC ENVIRONMENT: MATHEMATICAL ANALYSIS OF DATA, (IN FRENCH),
Centre Universitaire de Luminy, Marseille (France). Laboratoire d'Hydrobiologie Marine.
F. Blanc, M. Leveau, M. C. Bonin, and A. Laurec.
Mar Biol (Berl). Vol 14, No 2, p 120-129. 1972. Illus. English Summary.
Identifiers: Ecology, *Eutrophic environment, France, Mathematical analysis, Phyto plankton, *Rhone River (Mouth), Salinity, Zoo plankton.

Numerous data on physical, chemical and biological parameters in the dilution layer of the Rhone mouth have been studied by multivariate techniques: principal-component analysis, part correlation. A new technique of cluster analysis is also proposed. By these means, a very euryhaline group of zooplankton species was isolated and the extremely low sensibility by phytoplankton towards salinity was shown. However, temperature seems to be the most important ecological factor. Instability and eutrophy of this area do not appear to disturb the phytoplankton cycle, which occurs with its usual successions. Chlorophyll a and organic matter do not seem of value for estimation of the biomass in the area studied.--Copyright 1972, Biological Abstracts, Inc.
W73-10011

BLUE-GREEN ALGAE FROM THE KREMENCHUG RESERVOIR AS A BASE FOR GROWING MICROORGANISMS, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Inst. of Microbiology and Virology.
E. I. Kvasnikov, I. P. Stognii, T. P. Travchuk, I. F. Shchelokova, and T. M. Klyushnikova.
Gidrobiol Zh. Vol 7, No 6, p 80-83. 1971.
Identifiers: Algae, Aphanizomenon-Flos-Aquae, Fermentation, Growing, *Kremenchug Reservoir, Microcystis-Aeruginosa, Microcystis-Wesenbergii, *Microorganisms, Reservoirs, USSR, *Cyanophyta.

Desiccated Microsystis aeruginosa, M. wesenbergii and Aphanizomenom flos-aquae which were collected in 1968-69 in the Kremenchug Reservoir were studied to determine their suitability for use as a cheap base for the cultivation of heterotrophic microorganisms in the food and fermentation industries. Blue-green algae contained all the necessary components, including substantial amounts of polysaccharides which were difficult and easy to hydrolyze, and rich amounts of protein. There were sufficient amounts of ash elements, though they were poor in P. There was a wide assortment of group B vitamins.--Copyright 1972, Biological Abstracts, Inc.
W73-10013

EFFECT OF ARTIFICIAL AERATION ON SOME HYDROCHEMICAL INDICES OF WATER QUALITY, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Hidrobiologii.
For primary bibliographic entry see Field 05G.
W73-10014

BEHAVIOR OF IODINE 131 IN FRESHWATER BODIES, (IN RUSSIAN),
V. N. Gus'kova, A. N. Bragina, B. N. Il'in, A. A. Zasedatelev, and V. M. Kupriyanova.
Gig Sanit. Vol 36, No 9, p 46-49. 1971. Illus.
Identifiers: Fish, *Iodine-131, Pollution, Protozoa, Water pollution effects, Organism.

Experimental investigations were made of the effect of I131 on freshwater organisms, from protozoa to fishes, under conditions of 1-time pollution of the water with I131 in concentrations of 10 to the minus 7th power, 10 to the minus 6th power, 10 to the minus 5th power, 10 to the minus 4th power, and 10 to the minus 3rd power Ci/l. The results indicated that concentrations of I131 in a body of water of 10 to the minus 6th power Ci/l and less do not disturb its normal biological activity.--Copyright 1972, Biological Abstracts, Inc.
W73-10015

RETENTION LAKES OF LARGE DAMS IN HOT TROPICAL REGIONS, THEIR INFLUENCE ON ENDEMIC PARASITIC DISEASES,
R. Deschiens.
Bull Soc Pathol Exot. Vol 63, No 1, p 35-51, 1970. English summary.
Identifiers: Africa, Arthropods, Bilharziasis, Dams, *Diseases endemic, Lakes, Malaria, Mollusks, Onchocercosis, *Parasitic diseases, *Retention lakes, Tropical endemics.

A freshwater environment, complicated by industry and agriculture provokes, particularly in warm countries, geographic, climate, floristic and faunistic alterations, which may influence public health. Tropical endemics in Africa include malaria (3,000,000 fatal cases/yr in the world), bilharziasis (200-300 million patients in the world, and onchocercosis (severe African and American cases of blindness), which are dangerous parasitic infestations, whose vectors (arthropods, mollusks) are aquatic. The increase of freshwater areas provokes an extension of biocenoses comprising arthropods and their larvae and freshwater mollusks. A multiplication of malaria, bilharziasis and onchocercosis vectors, and an increase in diffusion possibilities of these parasitic infestations result. Epidemiologists and health services possess efficient defenses against such pathogenic complexes and sanitary hazards: controlled epidemiologic and demographic investigations and surveys of the pathogenic agents, clinical aspects of the diseases, and invertebrate vector (location, topographical distribution) and ethnic studies. Such documentation determines the specific prophylaxis to be used: drug chemoprophylaxis and control of vector invertebrates by either insecticide and molluskicide agents and pertinent sanitary education.--Copyright 1972, Biological Abstracts, Inc.
W73-10070

INFLUENCE OF FOOD QUALITY AND QUANTITY ON THE POPULATION DYNAMICS OF THE PLANKTONIC ROTIFER BRACHIONUS CALYCIFLORUS IN LABORATORY EXPERIMENTS AND IN THE FIELD, (IN GERMAN),
Munich Univ. (West Germany). Zoologisch-Parasitologisches Institut.
U. Halbach.
Verh D Tsch Zool Ges. 65, p 83-88. 1971. English summary.
Identifiers: Biomass, Brachionus-calyciflorus, Chlorella-pyrenoidosa, Food quality, Oocystis-parva, *Planktonic population, *Rotifers, Scenedesmus-obliquus, *Algae.

The influence of food quantity (Chlorella pyrenoidosa) upon duration of life, fertility, intrinsic rate of natural increase, and mean population density (environmental capacity) of B. calyciflorus was investigated by laboratory experiments. All these parameters show optima in relation to food density. This is the consequence of 2 different influences of the algae: at low food densities the

parameters are reduced by starvation, whereas at high densities they are reduced by detrimental effects of algal metabolites. In 15 field tanks (0.3 to 50 m3) strong fluctuations of the animals' population parameters as well as algal biomass were recorded. The algal densities covered all experimental ranges. Analysis showed a correlation of phytoplankton biomass with egg-ratio and population growth of Brachionus, but no correlation with population density. The relationships are mainly caused by the nutritional effect of Oocystis parva and Scenedesmus obliquus.--Copyright 1973, Biological Abstracts, Inc.
W73-10079

ECOLOGICAL FACTORS THAT INDUCE SEXUAL REPRODUCTION IN ROTIFERS, (IN GERMAN),
Munich Univ. (West Germany). Zoologisch-Parasitologisches Institut.
U. Halbach, and G. Halbach-Keup.
Oecologia (Berl). Vol 9, No 3, p 203-214. 1972. English summary.
Identifiers: Brachionus-Angularis, Brachionus-Calyciflorus, Brachionus-Rubens, Competition, Ecological factors, Phytoplankton, *Reproduction, *Rotifers.

Monogonont rotifers reproduce parthenogenetically or sexually. The proportion of sexual females in a population (rate of mixis) can be modified by external factors. Published data about these factors are inconsistent and in part even contradictory. In summer 1967 quantitative plankton studies were done in 15 tanks (0.3-50m3). The following parameters were recorded every third day: population density, egg rate (eggs/female), and rate of mixis of the 3 rotifer species Brachionus calyciflorus, B. rubens and B. angularis; pH, temperature, rainfall, and phytoplankton biomass (dry weight). The latter was subdivided into 3 categories: ultra, nanno and micro-plankton. A correlation analysis of the environmental factors revealed many intercorrelations. The coefficients of correlation between each rate of mixis and all other parameters are given. A most striking result is the absence of significant correlations among the rates of mixis of the 3 species. This means that the periods of sexuality of the 3 related species are independent of one another in the same biotope. No 1 factor shows a consistent positive or negative correlation with the rates of mixis of all 3 species. But there are no contradictions, i.e., none of the parameters is correlated positively in 1 species and negatively in another species. Positive correlations (or none) are demonstrated with temperature, changing of temperature, and micro-phytoplankton; negative correlations (or none) with total phytoplankton, ultra-phytoplankton, nanno-phytoplankton, eggs/female, and population density of the competing Brachionus species, in no case are significant correlations found with pH and rainfall. That factors with significant correlations do not show these correlations with all species could be due to different theshold values of the mixis-inducing factors in the 3 rotifer species. This study in no case shows a significant positive correlation between the rate of mixis and the population growth rate, or the rate of eggs/female. Some cases show a significant negative correlation. It is difficult to decide whether the significant factors influence the rate of mixis directly or indirectly. The intercorrelations of the factors suggest that in many, if not most, cases these influences are indirect.--Copyright 1973, Biological Abstracts, Inc.
W73-10080

DEPENDENCE OF PRODUCTION OF BACTERIA ON THEIR ABUNDANCE IN LAKE WATER,
Polish Academy of Sciences, Warsaw. Inst. of Ecology.
W. A. Godlewska-Lipowa.
Bull Acad Pol Sci Biol. Vol 20, No 5, p 305-308. 1972. Illus.
Identifiers: Abundance, *Bacteria, Lakes, *Productivity.

The effect of artificial decrease or increase of a natural bacterial community in lake water was studied. The lower the initial numbers, the higher was the percentage increase and the shorter was the generation time. All variants with lower densities, and the variant with the maximum density, displayed similar changes in number, beginning with 12-hr exposure. Generation time was much longer in all experimental variants (with the exception of the variant with the greatest density) than in the control sample.--Copyright 1973, Biological Abstracts, Inc.
W73-10082

CHEMICAL POLLUTION AND MARINE TROPHODYNAMIC CHAINS, (POLLUTIONS CHIMIQUES ET CHAINES TROPHODYNAMIQUES MARINES),
Centre d'Etude et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 9-25, 1972. 33 ref.

Descriptors: Water pollution, Industrial wastes, *Chemical wastes, *Detergents, *Pesticides, Metals, *Food chains, *Trophic level, Toxicity, Metabolism, Retention, Transfer, Biodegradation.
Identifiers: *Pelagic chain, Neritic chain, Benthic chain.

Chemical pollutants from industrial wastes, detergents and pesticides in the oceans are now not only hazardous to the flora and fauna in the marine environment but retransferred along the food chain to man. These chemical substances are metabolized by organisms living in the sea and by some phenomenon of concentration are retained in their tissues and then transferred along the various food chains. Some of these pollutants, particularly heavy metals, are very toxic to the human population. These phenomena were studied using several marine trophodynamic chains, the pelagic chain (phytoplankton, zooplankton, fish, and mammifers), neritic chain with mollusks (phytoplankton, mollusks, and mammifers), neritic chain with crustaceans, (Marine microorganisms, invertebrates, crustaceans; and mammifers), and the benthic chain, (Marine microorganisms, invertebrates, benthic fish and mammifers). Results of the research on toxicity thresholds, pollutant biodegradability and eventural toxicity transmission are presented. (Ensign-PAI)
W73-10091

UTILIZATION OF A TROPHODYNAMIC CHAIN OF A PELAGIC TYPE FOR THE STUDY OF TRANSFER OF METALLIC POLLUTION, (UTILISATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE PELAGIQUE POUR L'ETUDE DES POLLUTIONS METALLIQUES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, R. Bittel, F. Laumond, M. Romeo, and B. Donnier.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 27-52, 1972. 22 fig, 8 tab, 19 ref.

Descriptors: Water pollution effects, Metals, *Heavy metals, *Copper, *Chromium, *Zinc, *Lead, *Mercury, Toxicity, Food chains, *Trophic level, Transfer.
Identifiers: *Pelagic chain.

Discharge of mineral products into the sea is becoming more frequent and in larger amounts making it a necessity to assess the hazards of contamination to man through the consumption of marine products. This concentration phenomenon is studied in vitro. Through the use of marine food chains we can measure the factors of transfer of the different metals at each level of the pelagic food chain. Five heavy metals: copper, zinc, chromium, lead and mercury in an ionic or complex form, are studied and the results are presented in tables and the conclusions discussed. (Ensign-PAI)
W73-10092

STUDY OF THE TOXICITY OF EFFLUENTS FROM PAPER MILLS IN THE MARINE ENVIRONMENT, (ETUDE DE LA TOXICITE D'EFFLUENTS DE PAPETERIE EN MILIEU MARIN),
Centre d'Etude et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
B. Donnier.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 53-93, 1972. 1 fig, 4 tab, 31 graphs, 14 ref.

Descriptors: Water pollution effects, Pulp and paper industry, *Pulp wastes, *Toxicity, *Food chains, Trophic level, Transfer, Sewage, Degradation (Decomposition), Fish, Mollusks, Crustaceans.
Identifiers: *Pelagic chain, *Neritic chain, *Benthic chain.

The hazards incurred by pollution of the marine environment from paper mill wastes are determined by studying the marine food chains to the final consumer. The study of direct toxicity before and after degradation of sewage in the sea and the transmission of toxic products was conducted on four chains: pelagic chain, neritic chain with molluscs, neritic chain with crustaceans and the benthic chain with fish. Results are discussed and illustrated in tables and graphs. (Ensign-PAI)
W73-10093

MERCURY CONTAMINATION OF FISH OF THE SEA, (CONTAMINATION DES POISSONS DE MER PAR LE MERCURE),
For primary bibliographic entry see Field 05B.
W73-10094

EFFECTS OF CHEMICAL POLLUTION WITH RESPECT TO TELEMEDIATORS OCCURRING IN MICROBIOLOGICAL AND PLANKTONIC ECOLOGY IN THE MARINE ENVIRONMENT, (EFFETS DES POLLUTIONS CHIMIQUES VIS-A-VIS DE TELEMEDIATEURS INTERVENANT DAN S L'ECOLOGIE MICROBIOLOGIQUE ET PLANCTONIQUE EN MILIEU MARIN),
Centre de'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, M. Gauthier, B. Donnier, D. Pesando, and J-M. Pincemin.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 129-165, 1972. 43 tab, 22 ref.

Descriptors: Industrial wastes, *Chemical wastes, Aquatic environment, *Phytoplankton, *Bacteria, *Inhibitors, Diatoms, Pseudomonas, Pesticides, Detergents, Oil, Pulp wastes, Electricity, Fabrics.
Identifiers: *Telemediators, *Antibiotic action, Asterionella japonica.

The chemical pollutant's action, from industrial wastes, on primary telemediators acting on phytoplanktonic and bacterian relations was studied. For some pollutants, an inhibition or antibiotical activity was observed in the diatom Asterionella japonica and in two strains of marine bacteria belonging to the genus Pseudomonas. (Ensign-PAI)
W73-10095

LARVAL DEVELOPMENT OF MYTILUS EDULIS (L.) IN THE PRESENCE OF ANTIBIOTICS, (DEVELOPPEMENT LARVAIRE DE MYTILUS EDULIS (L.) EN PRESENCE D'ANTIBIOTIQUES),
Universite de Bretagne-Occidentale, Brest (France). Laboratoire de Zoologie.

M. Le Pennec, and O. Prieur.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 167-180, 1972. 8 plates, 10 ref. English summary.

Descriptors: *Bacteria, *Antibiotics, *Mollusks, *Larvae, Toxicity, Water pollution effects.
Identifiers: *Lamellibranch, *Mytilus edulis, Chloramphenicol, Aureomycine, Erythromycine, Sulfamerazine.

The influence of four antibiotics at several concentrations: chloramphenicol, aureomycine, erythromycine, and sulfamerazine on the larvae of Mytilus edulis, laboratory reared from the straight hinge stage to metamorphosis was investigated. The number of larvae alive in function of time for each of twenty-eight cultures is presented in diagrams and discussed. Effective and non-toxic concentrations of these antibiotics are shown. (Ensign-PAI)
W73-10096

THE MARINE ENVIRONMENT AND ORGANIC MATTER, (LE MILIEU MARIN ET LES MATIERES ORGANIQUES),
Centre d'Etude et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, J. Aubert, and M. Gauthier.
Revue Internationale d'Oceanographie Medicale, Vol 28, p 181-193, 1972. 10 ref. English Summary.

Descriptors: *Oceans, *Organic matter, Natural resources, *Biomass, Evolution, *Degradation (Decomposition), *Recycling, Resource development, Aquatic populations, Waste disposal, *Eutrophication, Productivity, Balance of nature, Ecology.

The processes of organic matter cycles in the sea: sources, evolution, degradation and recycling are reviewed. Man's influence on the natural cycle of the sea by depleting the biomass and the demographical expansion leading to an increase in organic matter production from wastes effect the balance of nature in the sea. Data on these processes are assessed and the consequences considered with emphasis on the phenomenon of eutrophication. The question of what man takes from the ocean in utilizing and developing the natural resources, balancing that which man puts into the ocean by discharge and the resulting production is discussed. (Ensig-PAI)
W73-10097

WE ARE KILLING THE OCEANS,
Senate, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10099

TRENDS IN MARINE WASTE DISPOSAL, GOOD AND BAD,
Engineering-Science, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 05E.
W73-10105

EFFECT OF POLLUTION ON THE MARINE ENVIRONMENT, A CASE STUDY,
Florida State Univ., Tallahassee. Marine Lab.
R. C. Harriss, H. Mattraw, J. Alberts, and A. R. Honke.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 249-264. 3 fig, 1 tab, 17 ref.

Descriptors: *Estuaries, Water pollution effects, *Industrial wastes, Waste disposal, *Mining, *Phosphates, *Domestic wastes, Envrionmental effects, Plankton, Aquatic animals, Nitrogen, Eutrophication, *Florida.
Identifiers: *Charlotte Harbor Estuary.

The impact of industrial activities on the Charlotte Harbor Estuary in Florida is considered. The estuary was subjected to waste discharges from phosphate mining and processing operations for 84 years, and extensive short term damage occurred from periodic failures in waste facilities. Long-term exposure to low-level, partially-treated, phosphate waste discharges did not measurably affect most plankton and animal communities, but the combined effects of phosphates and domestic wastes containing nitrogen are producing eutrophic conditions. A system that could determine the capacity of an aquatic environment to assimilate waste discharges is proposed. (See also W73-10098) (Ensign-PAI)
W73-10110

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. II. EFFICACY OF ANTIPETROLEUM PRODUCTS, (CHOIX DE PRODUITS POUR LUTTER CENTRE LA POLLUTION DU MILIEU MARIN LES HYDROCARBURES. II. EFFICACITE DES PRODUITS ANTIPETROLE),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
For primary bibliographic entry see Field 05G.
W73-10114

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. III. THE RELATIVE TOXICITY OF ANTIPETROLEUM PRODUCTS ON TWO MARINE ORGANISMS, (CHOIX DE PRODUITS POUR LUTTER CONTRE LA POLLUTION DU MILIEU MARIN PAR LES HYDROCARBURES. III. TOXICITE RELATIVE DE PRODUITS ANTIPETROLE SUR DEUX ORGANISMES MARINS),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
C. Alzieu.
Revue des Travaux de l'Institut des Peches Maritimes, Vol 36, No 1, p 103-119, March 1972. 19 fig, 2 tab, 27 ref.

Descriptors: Water pollution control, *Organic compounds, *Oil pollution, *Cleaning, *Emulsifiers, Detergents, Environmental effects, Wildlife, *Oysters, *Phytoplankton, *Toxicity, Seawater, Dispersion, Pollution abatement, Water pollution effects.
Identifiers: *Agglomerants, Precipitants, Polyglycol ethers, Crassostrea angulata, Phaeodactylum tricornutum.

The influence of toxic antipetroleum agents on marine fauna and flora is discussed and various methods to determine the toxicity and LD on different organisms are surveyed. Immediate toxicity was tested on oysters (Crassostrea angulata) and a phytoplanktonic alga (Phaeodactylum tricornutum) on which it feeds, to study effects on oyster closing and phytoplankton growth. Various concentrations of emulsifiers were tested and agglomerating and precipitating products were tested for dispersion in seawater. All products containing anionic detergents or polyglycol ethers reduced the coefficient of valvate activity. Polyglycol ether appeared less toxic to phytoplankton than to oysters. (See also W73-10113) (Ensign-PAI)
W73-10115

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. IV. THE RELATIVE TOXICITY OF SEVEN ANTIPETROLEUM EMULSION PRODUCTS, (CHOIX DE PRODUITS POUR LUTTER CONTRE LA POLLUTION DU MILIEU MARIN PAR LES HYDROCARBURES. IV. TOXICITE RELATIVE DE SEPT PRODUITS EMULSIONNANTS ANTIPETROLE),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
P. Maggi.
Revue des Travaux de l'Institut des Peches Maritimes, Vol 36, No 1, p 121-124, March 1972. 2 tab, 7 ref.

Descriptors: *Emulsifiers, *Toxicity, Water pollution effects, Aquatic animals, *Gastropods, Crustaceans, Fish, *Pollution abatement.
Identifiers: *Lamellibranchs, *Anguilla anguilla.

The relative toxicity of seven antipetroleum emulsifiers (E22, E30, E41, E46, E47, E52, and E53) was tested on three gastropods (Gibbula umbilicalis, Purpura lapillus and Littorina littorea), one lamellibranch (Mytilus edulis), three crustaceans (Artemia salina, Penaeus kerathurus and Clinabarius misanthropus), and one fish (Anguilla anguilla). The experiments were conducted on lots of 20-25 animals. Emulsifer E47 appeared the least toxic. (See also W73-10113) (Ensign-PAI)
W73-10116

PETROLEUM HYDROCARBONS IN OYSTERS FROM GALVESTON BAY,
Kiel Univ. (West Germany). Institut fuer Meereskunde.
For primary bibliographic entry see Field 05A.
W73-10117

EFFECTS OF CHLORINATED ALIPHATIC HYDROCARBONS ON LARVAL AND JUVENILE BALANUS BALANOIDES (L.),
Swedish Water and Air Pollution Research Lab., Goteborg (Sweden).
R. Rosenberg.
Environmental Pollution, Vol 3, p 313-318, 1972. 2 fig, 1 tab.

Descriptors: *Chlorinated hydrocarbons, Environmental effects, *Lethal limit, Larval growth stage, Juvenile growth stage, Life cycle, Analytical techniques, Water pollution effects, *Growth stages.
Identifiers: *Balanus balanoides (L.), Vinyl chloride, *North Sea, Norway coast.

Dumping of by-products from vinyl chloride-production (EDC-tar) was observed in the North Sea and off the west coast of Norway in concentrations of one-tenth the amount known to cause acute biological effects. The sublethal concentrations of these chlorinated aliphatic hydrocarbons on larval and juvenile Balanus balanoides (L) were determined. Reduction in swimming activity of the stage II nauplii occurred in an EDC-concentration of 2 ppm. Stage V and VI nauplii were affected in concentrations around 4 ppm. Newly-settled, 2-3 week old specimens, showed about ten times greater tolerance than did the stage II nauplii to EDC-tar. Tolerance seems to gradually increase with age in B. balanoides even when the species is exposed to abnormal conditions, such as heat, surfactants, detergents, or EDC-tar. (Ensign-PAI)
W73-10118

RESTRUCTURING OF SHORES AND SECONDARY POLLUTION. STUDY OF THE EUTROPHICATION OF HARBOR ZONES. (RESTRUCTURATION DES RIVAGES ET POLLUTIONS SECONDAIRES. ETUDE DE L'EUTROPHISATION DE ZONES PORTUAIRES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, J. Aubert, J-M. Pincemin, N. Desirotte, and J-Ph. Brettmeyer.
Revue Internationale d'Oceanographie Medicale, Vol 26, p 53-64, 1972. 3 tab, 6 ref. English summary.

Descriptors: *Harbors, Coasts, Water pollution effects, *Eutrophication, Wastes, *Sewage, Microorganisms, *Plankton, Organic matter, Phosphates, Nitrates, Salinity, Temperature, Currents, Bacteria.
Identifiers: *Flagellates, *Dinoflagellates.

Harbor areas isolated from hydrological exchange with the open sea are localities of the accumulation of substances and wastes, leading to biological imbalance of the marine environment. Investigation of secondary pollution evaluated the degree of eutrophication in seventeen harbors along the coast of France. Microorganisms and plankton were studied along with organic matter, nitrates, phosphates, salinity, temperature, and currents. Conditions for eutrophication were established at the different stations, at the harbor entrances, in the harbors (which received some municipal sewage) at the bottom of the harbor basins and in harbors with no sewage. A proliferation of flagellates and dinoflagellates, particularly at the bottom of the harbor basins was noted. Samples from the harbor entrances showed a gradual return to a normal plankton assemblage, but still contained organic matter and bacteria, which could pollute adjacent bathing beaches. (Ensign-PAI)
W73-10120

ANTAGONISMS AND SYNERGIES IN THE ANTIBIOSIS AMONG CERTAIN MARINE BACTERIA. ROLE OF CERTAIN RESPIRATORY ENZYMES IN THESE PHENOMENA. (ANTAGONISMES ET SYNERGIES DANS L'ANTIBIOSE CHEZ CERTAINES BACTERIES MARINES ROLE DE CERTAINS ENZYMES RESPIRATOIRES DANS CES PHENOMENES),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M-J. Gauthier.
Revue Internationale d'Oceanographie Medicale, Vol 26, p 65-83, 1972. 10 fig, 3 tab, 12 ref. English summary.

Descriptors: *Bacteria, *Antibiotics, Self-purification, *Inhibitors, Marine bacteria, Soil bacteria, Respiration, Enzymes, Animal physiology.
Identifiers: *Pseudomonas, *Chromobacterium, Antagonism, *Antibiosis, Synergistic action.

The antibacterial properties of six species - belonging to genera Pseudomonas and Chromobacterium - producing macromolecular antibiotics, associated with other marine bacterial strains are described. The consequences of such association on resultant inhibitory activity against terrestial bacteria are explained. Usually it leads to a decrease of inhibitory potential, however, a simple addition of both isolated inhibitory effects, or even synergistic action can be observed. Every marine catalase producing strain gives an association with antagonistic features. This can be attained with the purified enzyme as it can with peroxidase solution. The systematical position and the way of action of the antibiotic products of these six species are discussed and some of the interspecific relations which may be possible in the natural environment between these species and the whole bacterial microflora are explained. (Ensign-PAI)
W73-10121

CHANGES IN THE ECOLOGICAL BALANCE OF INVERTEBRATE COMMUNITIES IN KELP HOLDFAST HABITATS OF SOME POLLUTED NORTH SEA WATERS,
Durham Univ. (England). Dept. of Botany.
D. J. Jones.
Helgolander Wissenschaftliche Meersuntersuchungen, Vol 23, No 2, p 248-260, June 1972. 6 fig, 3 tab, 23 ref.

Descriptors: Oceans, *Algae, *Invertebrates, *Food chains, Pollutants, Water pollution effects, Ecology.
Identifiers: *Laminairie hyperborea, *Species diversity, Long-term effects, *North Sea.

A spatial and temporal study of the neotenous, pollution-tolerant community found in the holdfast habitats of Laminaria hyperborea off the coast of Britain was conducted. Random samples of 1 to 7 year old holdfasts of the kelp plant were collected at each of fifteen stations, in the polluted and non-polluted waters along the shores of northeast England and southwest Scotland. Species diversity was consistently greater at non-polluted stations. Mytilus edulis, Asterias rubens, Nereis pelagica and Sabellaria spinulosa werbellaria spinulosa were the most abundant species in polluted areas. It is noted that this kind of reduction in species diversity leaves only one possible detritus food chain in the habitat. Possible long-term effects of pollution on kelp forests are discussed. (Ensign-PAI)
W73-10123

A SHORT SURVEY OF THE ENVIRONMENT AT THE DUMPING SITE FOR SANTA CRUZ HARBOR DREDGING,
Moss Landing Marine Labs., Calif.
For primary bibliographic entry see Field 05B.
W73-10124

THE CHANGING CHEMISTRY OF THE OCEANS,
Goteborg Univ. (Sweden). Dept. of Analytical Chemistry.
For primary bibliographic entry see Field 05B.
W73-10125

THE OCEAN: OUR COMMON SINK,
Norske Videnskaps-Akademi i Oslo.
T. Heyerdahl.
Environment this Month, Vol 1, No 1, p 6-10, July 1972. 3 fig.

Descriptors: *Oceans, Pollutants, *Environmental effects, Water pollution effects, Waste disposal.
Identifiers: *Kon-Tiki, *Ra Expeditions.

Detrimental changes in ocean conditions are discussed; observations from an expedition in 1947 are compared to those made in 1970. The condition of coastal rocks and cliffs (where much marine life centers) near islands like Malta and Cyprus in the Mediterranean is deplorable. Fins, plastic containers, and oil slicks float visibly between boulders and in crevices. The high content of insecticides and detergents flowing into the oceans from industry and agriculture are beginning to sterilize the coastline. The oceans are being greatly over-taxed by growing amounts of 'unnatural' pollutants; the ocean cannot filter all of these wastes, consequently we are in danger of depleting one of the earth's greatest resources. (Ensign-PAI)
W73-10126

THE EFFECTS OF SUSPENDED 'RED MUD' ON MORTALITY, BODY WEIGHT, AND GROWTH OF THE MARINE PLANKTONIC COPEPOD, CALANUS HELGOLANDICUS,
California Univ., San Diego. Inst. of Marine Resources.
G-A. Paffenhoefer.
Water, Air, and Soil Pollution, Vol 1, No 3, p 314-321, July 1972. 2 fig, 2 tab, 7 ref. AEC AT (11-1) GEN 10, P.A. 20.

Descriptors: *Industrial wastes, *Aluminum, *Copepods, Growth, *Dumping, Water pollution effects, Laboratory tests, Toxicity, Sediments, Mud.
Identifiers: *Red mud, Calanus helgolandicus.

'Red mud' is the residual substance after the extraction of Al from bauxite; it is a waste product associated with aluminum production. The effects of red mud on growth, body weight and mortality of the copepod Calanus helgolandicus were investigated. Laboratory tests were conducted using copepods which ingested large quantities of red mud and control groups. Growth of the experimental copepods was delayed in comparison to the control group; the red mud group also had a higher mortality rate than the controls. The small amount of phytoplankton present in red mud weakens the animals; although they ingest large quantities of mud, they were unable to attain a sufficient amount of nutritive material. Adult copepods in the red mud group exhibited sluggish swimming movements and slow reactions which would make them easy prey for their predators. The study concludes that the proposed dumping of red muds into the North Sea will create a serious problem in the nutrition, survival, and reproduction of planktonic copepods. (Ensign-PAI)
W73-10127

GULF STATES OYSTER SEMINAR REVIEWS RECENT AREA SCIENTIFIC DEVELOPMENTS.

Fish Boat, Vol 17, No 11, p 16, 34-36, November 1972.

Descriptors: *Gulf of Mexico, *Oysters, *Fisheries, *Dredging, *Sewage effluents, Disease, Pollutants, Water quality standards, Water pollution effects.

Some problems facing the oyster industry along the Gulf Coast are discussed. Scientists from Texas, Louisiana, Florida, Alabama and Mississippi briefly outline the sorts of problems which represent the most significant threats to oysters in their state waters. Some common complaints include pollution caused by dredging, by dumping raw sewage, and by increased mercury levels. Troubles attributed to hurricanes, siltage and oxygen depletion were also mentioned. The spread of diseases carried by oysters, such as hepatitis, is potentially dangerous, unless strict standards of sanitation are enforced within the oyster industry. The need for greater research into areas of pollution, disease etc., is stressed. (Ensign-PAI)
W73-10130

ESTUARIES AND INDUSTRY,
University of Strathclyde, Garelochhead (Scotland). Marine Lab.
For primary bibliographic entry see Field 05B.
W73-10133

SPECIAL PROBLEMS OF THE ARCTIC ENVIRONMENT,
Arctic Inst. of North America, Washington, D.C.
M. E. Britton.
In: Canadian-U.S. Maritime Problems, Law of the Sea Workshop, June 15-17, 1971, Toronto, Canada, University of Rhode Island, Kingston, Law of the Sea Institute, p 9-28. L.M. Alexander and G.R.S. Hawkins, editors, 6 fig, 18 ref. 1972.

Descriptors: *Arctic, *Arctic Ocean, *Ice, *Water pollution, *Air pollution, Oil industry, Oil fields, Tundra, Ecosystems, Balance of nature, Water pollution effects.

A discussion of Arctic environments is presented, with emphasis on the special problems which are unique to the area. Atmospheric conditions, basic features of the Arctic Ocean basin, the role of the continental shelves, the marine ecosystem and the tundra ecosystem are some of the areas discussed. Pollution of the Arctic atmosphere and/or ice could upset present climatic and oceanographic conditions and begin a potentially disasterous warming trend. About two-thirds of the Arctic Ocean bottom is continental shelf, in which lies oil. However, ice and shallow waters make it difficult to extract and transport. Oil resources on the tundra are more feasible; the possible effects of oil

exploitation on the tundra ecosystem and the complex nature of permafrost are investigated. The marine ecosystem is also discussed in some detail; although the ocean has few numbers of species, the individuals of each species are abundant. All primary production occurs in a very shallow ocean layer where light and heat are appropriate. Any alteration of this layer by pollutants could cause far-reaching effects on the ecosystem. (Ensing-PAI)
W73-10134

A CONTINUOUS CULTURE OF DESULFOVIBRIO ON A MEDIUM CONTAINING MERCURY AND COPPER IONS,
Netherlands Inst. for Sea Research, Den Helder.
J. H. Vosjan, and G. J. Van der Hoek.
Netherlands Journal of Sea Research, Vol 5, No 4, p 440-444, May, 1972. 2 tab, 7 ref.

Descriptors: *Bacteria, *Mercury, *Copper, *Cultures, *Biodegradation, Toxicity, Water pollution effects, Growth.
Identifiers: *Desulfovibrio, Continuous cultures.

A continuous culture of Desulfovibrio was used to study the effects of mercury and copper. It was determined that once a continuous culture of Desulfovibrio is in progress the toxic effects of Hg and Cu are nullified and do not affect the growth of the organisms. Atomic absorption analyses showed that the elements had been removed from the liquid. Similar experiments carried out on batch cultures of Desulfovibrio caused the cessation of all growth. It appears from this study that microbiological processes of the sort that occur in continuous cultures, could be used to render toxic metals innocuous, to remove them from polluted waters, and to fix them as sulphides. (Ensign-PAI)
W73-10135

INFLUENCE OF AEROSOLS IN THE MARINE ENVIRONMENT (INFLUENCE DES AEROSOLS MARINS DANS L'ENVIRONMENT),
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 05B.
W73-10136

DETERMINATION OF THE YIELD BY LIQUID SCINTILLATION OF THE 14C IN THE MEASUREMENT OF PRIMARY PRODUCTION IN A LAGOON ENVIRONMENT, (DETERMINATION DES RENDEMENTS DU COMPTAGE PAR SCINTILLATION LIQUIDE DU 14C DANS LES MESURES DE PRODUCTION PRIMAIRE EN MILIEU LAGUNAIRE).

Revue Internationale d'Oceanographie Medicale, Vol 26, p 27-41, 1972. 3 fig, 12 ref. English summary.

Descriptors: *Lagoons, *Carbon radioisotopes, Environmental effects, *Primary productivity, Cytological studies, Solubility, Solvents, Pollutant identification, Water pollution effects.
Identifiers: *Liquid scintillation, *Counting efficiency.

Liquid scintillation was used to calculate 14C in primary productivity measurements. Lagoons presented non-homogeneous samples for determination of counting efficiency. A partial solubilization of cells by organic solvent was indicated from the results of this experiment. The channel ratio should be used for a correct counting efficiency determination. (Ensign-PAI)
W73-10137

EFFECT OF PESTICIDES ON CHOLINESTERASE FROM AQUATIC SPECIES: CRAYFISH, TROUT AND FIDDLER CRAB,
Louisiana State Univ., New Orleans. Dept. of Chemistry.
G. G. Guilbault, R. L. Lozes, W. Moore, and S. S. Kaun.
Environmental Letters, Vol 3, No 4, p 235-245, 1972. 2 fig, 3 tab, 12 ref. NIH ES-00426-01.

Descriptors: Pesticides, *Pesticide residues, Oceans, *Crabs, *Crayfish, *Trout, Laboratory tests, *Enzymes, Water pollution effects.
Identifiers: *Tolerance levels, *Cholinesterase enzymes.

Purified cholinesterose enzymes were isolated in samples of trout, crayfish and fiddler crabs; nineteen pesticides were tested for inhibition of cholinesterase activity. Laboratory analyses show that trout cholinesterase is insensitive to all chlorinated and most organophosphorous pesticides. Crayfish have a high sensitivity to paraoxon and Mesurol and fiddler crabs are selectively inhibited by six pesticides. Overall, chlorinated pesticides seem to have little inhibitory effect on trout or crab cholinesterase; carbamates strongly inhibit all three enzymes. The experimental method of isolating the purified enzyme from each sampled species permitted a very sensitive and selective assay. (Ensign-PAI)
W73-10138

PHENYLALANINE METABOLISM ALTERED BY DIETARY DIELDRIN,
Bureau of Sport Fisheries and Wildlife, Columbia, Mo. Fish-Pesticide Research Lab.
P. M. Mehrle, M. E. DeClue, and R. A. Bloomfield.
Nature, Vol 238, No 5365, p 462-463, August 25, 1972. 3 fig, 16 ref.

Descriptors: *Trout, *Dieldrin, *Metabolism, Insecticides, Enzymes, Amino acids, Water pollution effects.
Identifiers: *Salmo gairdneri, *Liver, Blood, Urine samples.

The chronic effects of dieldrin on metabolic pathways in the rainbow trout, Salmo gairdneri, are described. Specific areas studied in the trout were liver phenylaline hydroxylase activity, serum phenylalanine, and phenylpyruvic acid concentrations in urine. The fish were fed daily portions of food containing differing doses of dieldrin equivalent to 4% of their body weight for 300 days; then liver, blood, and urine samples were taken and analyzed. Whole body residues were also investigated in some of the fish samples. The results showed that liver phenylalanine hydroxylase activity was significantly decreased by all doses of dieldrin; there was a negative correlation between dieldrin dose and enzyme activity. Serum phenylalanine concentration was increased by all doses of dieldrin; urinary phenylpyruvic acid increased in dieldrin. It is concluded that dieldrin has a marked effect on phynylalanine metabolism and can induce the biochemical manifestations of phenylketonuria. (Ensign-PAI)
W73-10140

NATURE AND POISONOUS CHEMICALS, (IN RUSSIAN),
D. F. Rudnev, and N. E. Kononova.
Lesn. prom'st Moscow. 1971. 141 p, Illus.
Identifiers: Ant, Bee, Bird, Chemicals, Fish, Humans, *Insecticides, Mammals, *Poisonous chemicals, *Entomofauna, *Fauna.

Information is given on the effect of insecticides on the useful fauna. There is a discussion of the different types of insecticides, the effect of chemical treatment on the soil of the forest and the soil fauna, on the entomofauna, the ants, bees, fishes, birds, mammals, and man.--Copyright 1973, Biological Abstracts, Inc.
W73-10155

ON THE PHYTOPLANKTON OF WATERS POLLUTED BY A SULPHITE CELLULOSE FACTORY,
Jyvaskyla Univ. (Finland). Dept. of Biology.
P. Eloranta.
Ann Bot Fenn. Vol 9 No 1, p 20-28. 1972. Illus.
Identifiers: Carbon dioxide, Cellulose, *Finland, *Phytoplankton, Polluted water, *Sulfites, Water pollution effects, *Pulp wastes, Industrial wastes.

In summer 1970 a study was made of the species composition and biomass of the phyto-plankton in the northern part of Kuorevesi, in the northeast of the Kokemaenjoki basin, Finnish Lake District, whose waters are polluted by the effluents of a sulfite cellulose factory. Observations were also made on the concentrations of O2, CO2 and on the pH.--Copyright 1973, Biological Abstracts, Inc.
W73-10156

ENRICHMENT EXPERIMENTS IN THE RIVERIS RESERVOIR,
Bonn Univ. (Germany). Zoological Inst.
H. Schnitzler.
Hydrobiologia. Vol 39 No 3, p 383-404. 1972. Illus. (English summary).
Identifiers: *Germany, *Nitrates, *Phosphates, Phytoplankton, Reservoirs, *Riveris reservoir, Nutrients.

From March 1967 to Oct. 1968 enrichment experiments with PO4 (3-) and NO3 (2-) nitrate were carried out in the Riveris reservoir near Trier (Germany). Plastic bags filled with 70 l of the reservoir water were placed into the lake after NO3 (2-) and PO4 (3-) was added. When only NO3 (2-) was added, no enhancement of phytoplankton grown could be established. The phytoplankton in those bags to which PO4 (3-) was added in most cases increased according to the amount of added phosphate. Only in a few cases was an increase of plankton seen when NO3 (2-) and PO4 (3-) were added. These results show that in the Riveris reservoir phosphate is a limiting factor for the phytoplankton.--Copyright 1973, Biological Abstracts, Inc.
W73-10157

DEPENDENCE OF PRIMARY PRODUCTION OF PHYTOPLANKTON ON BIOGENIC ELEMENTS AND LIGHT, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Okeanologii.
Yu. G. Kabanova, and Yu. E. Ochakovskii.
Dokl Akad Nauk SSSR Ser Biol. Vol 201 No 5, p 1227-1230. 1971. Illus.
Identifiers: Biogenic elements, Light, *Phytoplankton, *Primary production, *Photosynthesis.

A direct relation between the increment of primary production and concentration of elements at all levels of light energy was observed for natural populations of phytoplankton. The optimal illumination for photosynthesis of natural populations of phytoplankton was on the average at an energy of 46 W/m2 at a depth of 25 m. On the surface, in the case of a subsurface energy exceeding 300 W/m2, photosynthesis was inhibited by an excess of light, and at a depth of 50 m at an energy of about 13 W/m2, by a shortage of energy.--Copyright 1973, Biological Abstracts, Inc.
W73-10158

STUDIES ON THE WATER POLLUTION AND PRODUCTIVITY IN KYONGGI BAY IN SUMMER SEASON (3): CLASSIFICATION OF THE PHYTOPLANKTON (III), (IN KOREAN),
Seoul National Univ. (Republic of Korea). Dept. of Botany.
Y. H. Chung, J. H. Shim, and M. J. Lee.
Identifiers: Bays, Chrysophyta, Classification, *Korea, *Kyonggi Bay, *Phytoplankton, Pollution, *Productivity, Pyrrophyta, Seasonal, Species, Water pollution effects.

The classification of phytoplankton species collected from Chawol-do, Soya-do and Pung-do of Kyonggi-Bay is discussed. One hundred and forty-three kinds of phytoplankton from this area were identified and classified by Engler's system into 17 families, 47 genera, 129 spp., 10 varieties and 4 forms, belonging to Pyrrophyta and Chrysophyta. Three families, 7 genera, 10 spp., 3 varieties and 3 forms are added to the list published in part I. Seven species and one form described are new to Korea.--Copyright 1973, Biological Abstracts, Inc.
W73-10159

EFFECTS OF SR90 (Y90), ZN65, AND CR51 ON THE LARVAE OF THE PACIFIC OYSTER CRASSOSTREA GIGAS,
Washington Univ., Seattle. Coll. of Fisheries.
V. A. Nelson.
In: The Columbia River Estuary and Adjacent Ocean Waters, Bio-environmental Studies (A.T. Pruter and D.L. Alverson, eds.), University of Washington Press, Seattle, Washington, 1972, p 819-832. 1 fig, 3 tab, 15 ref.

Descriptors: *Oysters, *Zinc radioisotopes, *Strontium radioisotopes, *Larval growth stage, Lethal limit, Radioactivity affects, Radiosensitivity, Spawning, Estuarine fisheries, Environmental effects, Estuarine environment, Columbia River.
Identifiers: *Willapa Bay.

Studies were undertaken to determine what concentration of radionuclides would effect oysters in the Willapa Bay fishery. The production of abnormal larvae was selected as a measure of effects since this criterion has been equated with mortality in a study of effects of sulfite waste liquor. The radionuclide concentrations that increased abnormalities in oyster larvae (100 microCuries/liter of Zn65, 1000 microCuries/liter of Sr90 (Y90) and Cr51) are one-million-fold greater than present in the environment. (Bopp-ORNL)
W73-10172

BIOENVIRONMENTAL FEATURES: AN OVERVIEW.
National Marine Fisheries Service, Seattle, Wash.
For primary bibliographic entry see Field 05B.
W73-10174

FALLOUT PROGRAM. QUARTERLY SUMMARY REPORT (DEC. 1, 1972 THROUGH MARCH 1, 1973),
New York Operations Office (AEC), N.Y. Health and Safety Lab.
For primary bibliographic entry see Field 05B.
W73-10175

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAMS - QUARTERLY SUMMARY REPORT. (DEC. 1, 1972 THROUGH MARCH 1, 1973),
New York Operations Office (AEC), N.Y. Health and Safety Lab.
For primary bibliographic entry see Field 05B.
W73-10176

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SALEM NUCLEAR GENERATING STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10177

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10178

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED SAN ONOFRE NUCLEAR GENERATING STATION - UNITS 2 AND 3.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10179

CALCULATIONS OF ENVIRONMENTAL RADIATION EXPOSURES AND POPULATION DOSES DUE TO EFFLUENTS FROM A NUCLEAR FUEL REPROCESSING PLANT,
Office of Radiation Programs, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10180

RESEARCH ON THE MARINE FOOD CHAIN, PROGRESS REPORT JULY 1971-JUNE 1972.
California Univ., San Diego, La Jolla. Inst. of Marine Resources.

Available from NTIS, Springfield, Va., as UCSD 10P20-121; $9.00 in paper copy, $0.95 in microfiche. Report UCSD 10P20-121, 1972. 728 p.

Descriptors: *Oceanography, *Phytoplankton, *Estuarine environment, *California, Path of pollutants, Carbon radioisotopes, Nitrogen fixation, *Nutrients, Upwelling, Organic matter, Carbon cycle, Nitrogen, Phosphorus, Europhication, Polar regions, Research and development, Vitamins, Vitamin B.

Progress reports on current research programs, manuscripts of completed work that will be submitted to the open literature, and data on nutrients and phytoplankton in waters off southern California from a July 1970 cruise are presented. Topics include factors affecting eutrophication in coastal waters; the content in polar seas of N, P, dissolved organic C, and vitamins; fixation of dissolved nitrogen gas; and the radioactivity of dissolved and particulate organic C. (Bopp-ORNL)
W73-10200

A STATISTICAL STUDY OF RADIATION DOSE FOR FISHERMEN,
Battelle-Pacific Northwest Labs., Richland, Wash.
T. H. Beetle.
Available from NTIS, Springfield, Va., as BNWL-SA-4449; $4.00 in paper copy, $0.95 in microfiche. Report BNWL-SA-4449, Dec 1972, 19 p, 10 fig.

Descriptors: *Columbia River, *Radioactivity effects, *Public health, *Food chains, Radioisotopes, Absorption, Fish diets, Statistical models, Surveys, Statistical methods, Water pollution effects, Nuclear wastes, Path of pollutants, Environmental effects.

Statistical concepts are applied in an investigation of an environmental disturbance (release of radionuclides to the Columbia River) on a human population. The design of multistage sampling decreased the standard-deviation error of the estimate obtained with a given time allocation for the total number of interviews. It is estimated that the average internal dose for a Tri-City eater of Columbia River fish in 1966-67 was 8.25 mrem/yr and that the average external dose of a fisherman was 0.6 mrem/yr. (Bopp-ORNL)
W73-10203

AQUATIC RADIOLOGICAL ASSESSMENTS AT NUCLEAR POWER PLANTS,
Portland General Electric Co., Oreg.
For primary bibliographic entry see Field 05B.
W73-10204

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONTINUATION OF CONSTRUCTION AND OPERATION OF UNITS 1 AND 2 AND CONSTRUCTION OF UNITS 3 AND 4 OF NORTH ANNA POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10205

ENVIRONMENTAL MONITORING AT ARGONNE NATIONAL LABORATORY - ANNUAL REPORT FOR 1972,
Argonne National Lab., Ill.
For primary bibliographic entry see Field 05A.
W73-10206

A COMPARATIVE STUDY OF TWO METHODS OF ESTIMATING HUMAN INTERNAL EXPOSURE HAZARDS RESULTING FROM THE INGESTION OF SEA FOODSTUFFS,
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Centre d'Etudes Nucleaires.
R. Bittel.
Available from NTIS, Springfield, Va., as CONF-720503-5; $3.00 in paper copy, $0.95 in microfiche. CONF-720503-5, 1972. 5 p, 1 tab, 5 ref.

Descriptors: *Public health, *Food chain, *Radioisotopes, *Nuclear wastes, *Fallout, Path of pollutants, Radioecology, Mathematical models, Systems analysis, Marine biology, Marine animals, Marine fisheries, Radiosensitivity, Absorption, Metabolism, Fish diets, Water pollution effects, Radioactivity effects, Radioactivity techniques.

The maximum permissible concentration of radionuclides in sea water was calculated on the basis of the dose to the critical organ from an annual diet consisting of 12 kg of fish, 13 of mollusks, and 3 of crustaceans. Ratios of the values obtained by the specific-activity method (w72-04484) to those obtained by the concentration-factor method were: Ca45, 50; Cs137, 15; Mn54, 12; I131, 10. Close agreement by the two methods was obtained for Na24, P32, Fe55, Co60, Zn65, and Mo99. It is considered that either approach is justified when the elements have metabolic regulation, and that the choice between the two depends upon the availability of reliable values of the required parameters. Different methods are required when the critical organ is the gastrointestinal tract. (Bopp-ORNL)
W73-10208

POLYCHLORINATED BIPHENYLS-ENVIRONMENTAL IMPACT. A REVIEW BY THE PANEL ON HAZARDOUS TRACE SUBSTANCES. MARCH 1972,
Minnesota Univ., St. Paul. Coll. of Veterinary Medicine.
For primary bibliographic entry see Field 05B.
W73-10221

THE IMPACT OF ARTIFICIAL RADIOACTIVITY ON THE OCEANS AND ON OCEANOGRAPHY,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05B.
W73-10226

CURRENT STATUS OF RESEARCH ON THE BIOLOGICAL EFFECTS OF PESTICIDES IN CHESAPEAKE BAY,
Westinghouse Ocean Research Lab., Annapolis, Md.
T. O. Munson, and R. J. Huggett.
Chesapeake Science, Vol 13, (Supplement), p S 154-S 156, December 1972.

Descriptors: *Chesapeake Bay, *Pesticides, *Water pollution effects, *Ecosystem, Fish, Gulls, Clams, Research, Programs, *Monitoring, Planning, Management, Virginia, Maryland, Federal government, Bays.

Monitoring and research programs for Chesapeake Bay carried out by Virginia, Maryland, and federal agencies are discussed. Apart from the EPA monitoring program on fish, no Bay-wide pesticide monitoring is presently being done. Sea gulls and soft-shelled clams would be important and representative species to monitor in a Bay-wide program. Several programs could be initiated to give management a better estimate of both existing conditions and probable pesticide effects on the ecosystem. (Ensign-PAI)
W73-10231

CURRENT STATUS OF KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF HEAVY METALS IN THE CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Environmental Medicine.
J. M. Frazier.
Chesapeake Science, Vol 13, (Supplement), p S 149-S 153, December 1972. 35 ref.

Descriptors: *Chesapeake Bay, *Estuarine environment, Water pollution sources, *Heavy metals, *Distribution patterns, *Water pollution, Environmental effects, *Biota, Productivity, Toxicity, Food chains, Trophic level, Temperature, Salinity, Dissolved oxygen, Sediments, Bays.
Identifiers: Bioavailability.

The knowledge concerning the bioavailability, effects on productivity, and contamination problems of heavy metals in the Chesapeake Bay is discussed. The investigation of the bioavailability of heavy metals in estuarine systems has barely scratched the surface. The effects of heavy metals on the productivity of higher trophic levels cannot be predicted at this time. Adequate information concerning biological contamination by these metals is still lacking in many areas. Specific areas where research is required are listed. (Ensign-PAI)
W73-10232

CURRENT STATUS OF KNOWLEDGE CONCERNING THE CAUSE AND BIOLOGICAL EFFECTS OF EUTROPHICATION IN CHESAPEAKE BAY,
Maryland Univ., Solomons. Natural Resources Inst.
D. A. Flemer.
Chesapeake Science, Vol 13, (Supplement), p S144-S149, December 1972. 28 ref.

Descriptors: *Chesapeake Bay, *Estuarine environment, *Eutrophication, *Phytoplankton, *Nutrients, Water pollution control, Primary productivity, Standing crops, Photosynthesis, Plant physiology, Nutrient requirements, Protein, Phosphorus, Carbon, Nitrogen, Hydrogen, Oxygen, Research, Planning, Bays.

The basic terms and concepts of eutrophication are briefly presented. Conditions in the Chesapeake Bay are discussed with reference to phytoplankton blooms and guidelines on nutrient requirements and supply. Solutions for the control of the effects of eutrophication are discussed and general research guidelines for the Chesapeake Bay and other waters are listed. (Ensign-PAI)
W73-10233

CURRENT STATUS OF THE KNOWLEDGE OF THE BIOLOGICAL EFFECTS OF SUSPENDED AND DEPOSITED SEDIMENTS IN CHESAPEAKE BAY,
Maryland Univ., Prince Frederick, Hallowing Point Field Station.
J. A. Sherk, Jr.
Chesapeake Science, Vol 13, (Supplement), p S137-S144, December 1972. 47 ref.

Descriptors: *Chesapeake Bay, *Sedimentation, *Deposition (Sediments), *Suspended loads, Inorganic compounds, Organic matter, Estuarine environment, Environmental effects, Aquatic life, Protection, Projects, Bays.

Suspended particulate organic and inorganic material and substratum changes associated with its deposition may be expected to affect estuarine organisms in a number of ways. The nature of the sediment input into the Chesapeake Bay is reviewed. The effects of suspended particles and deposited sediments on organisms in the Bay are discussed. Criteria for protection of the Bay are presented. Areas for consideration when assessing a projects effects on sedimentation are listed. (Ensign-PAI)
W73-10234

BIOLOGICAL CRITERIA OF ENVIRONMENTAL CHANGE IN THE CHESAPEAKE BAY,
Virginia Inst. of Marine Science, Gloucester Point. Dept. of Ecology-Pollution.
For primary bibliographic entry see Field 05B.
W73-10235

(BIOTA OF THE CHESAPEAKE BAY), CONCLUSIONS AND RECOMMENDATIONS,
Maryland Univ., Prince Frederick, Hallowing Point Field Station.
For primary bibliographic entry see Field 05B.
W73-10236

POSSIBLE EFFECTS OF THERMAL EFFLUENTS ON FISH: A REVIEW,
Washington, Univ., Seattle. Coll. of Fisheries.
J. R. Sylvester.
Environmental Pollution, London, Vol 3, p 205-215, July 1972. 2 fig, 1 tab, 75 ref.

Descriptors: *Thermal pollution, Temperature, Environmental effects, *Fish physiology, *Metabolism, *Reproduction, Growth rates, Lethal limit, Spawning, Fry, Heat resistance, Water pollution effects, *Reviews.
Identifiers: *Thermal shock, Acclimation, Sensing, Temperature preferences, Synergism.

Literature on specific considerations of thermal effluents (metabolism; thermal shock; reproduction and development; acclimation and lethal limits; fluctuations and sensing; temperature preferences; and synergism) is reviewed. Fish physiology is affected generally and specifically by thermal stress. Over a species-specific temperature range, increasing temperatures generally increase metabolic rates and other activity. A cessation of spawning behavior or an increase of abnormal fry can be caused by deviations from optimal temperature. The final level of temperature acclimation is a function of species, size, condition, and past environment. Most fish can acclimate faster to higher temperatures than to lower temperatures. Fluctuating temperatures increase thermal resistance in some species. Temperature preferences are a function of acclimation temperature and of the species-specific optimum temperature. Slight increases in temperature can be lethal because of synergism. (Ensign-PAI)
W73-10238

KILLING OF MARINE LARVAE BY DIESEL OIL,
Alberta Univ., Edmonton. Dept. of Zoology.
F-S. Chia.
Marine Pollution Bulletin, London, Vol 4, No 2, p 29-30, February 1973.

Descriptors: *Oil, Water pollution effects, *Larvae, *Animal physiology, *Mortality.
Identifiers: *Diesel oil (No 2), Echinodermata, Mollusca, Annelida, Arthropoda, Urochordata.

Laboratory observations are given on the effect of Texaco No 2 diesel oil on 14 species of 5 phyla of pelagic larvae. All larvae died at different durations (from 3-72 hours) after being placed in 0.5% oiled seawater, except Crossaster which survived eight days. Symptoms of contact with oil are acute contractions of the gut, asynchronization and sluggish beat of cilia or setae, and occasional violent movement of the body. Species specificity in terms of survival may be related to larval size. (Ensign-PAI)
W73-10241

EFFECTS OF OIL UNDER SEA ICE,
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
For primary bibliographic entry see Field 05B.
W73-10246

UPPER POTOMAC ESTUARY EUTROPHICATION CONTROL REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
N. A. Jaworski, L. J. Clark, and K. D. Feigner.
Environmental Protection Agency, Annapolis Field Office, Technical Report No 53, April 1972. 45 p, 6 fig, 5 tab, 11 ref.

Descriptors: *Chesapeake Bay, *Potomac River, *Estuaries, *Water pollution control, *Eutrophication, *Nutrient removal, Programs, Planning, Management, Costs, Treatment, Information exchange, Treatment facilities.

Identification of the needs, costs, and mechanisms for controlling eutrophication in the Potomac Estuary was made and an attempt at implementing the program has begun. With capital cost for nutrient removal of over $250,000,000, a need exists for continuous efforts to improve eutrophication control, treatment methods, cost estimates, and institutional arrangements. Maintenance of free-flowing continuous exchange of information among the various agencies conducting the removal requirement studies, designing and facilities, and planning the overall management needs is also necessary. These interactions are the basis for successful management planning. (Ensign-PAI)
W73-10247

INTERTIDAL ALGAL SPECIES DIVERSITY AND THE EFFECT OF POLLUTION,
Sydney Univ. (Australia). School of Biological Sciences.
M. A. Borowitzka.
Australian Journal of Marine and Freshwater Research, Vol 23, No 2, p 73-84, December 1972. 2 fig, 4 tab, 35 ref.

Descriptors: *Sewage, *Outfalls, *Water pollution effects, *Intertidal areas, *Algae, Sites, Growth rates, Water analysis.
Identifiers: *Species composition, Species diversity, Species reduction.

Determination of the species diversity of the larger intertidal algae at 3 sites along the coastline of Sydney, N.S.W. was made. The height from mean of low water (MLW), distance from the edge of the rock platform at MLW, and distance from a sewer outfall (i. e., the degree of pollution) were correlated with changes in species composition and species diversity. Algal species number reduced in the vicinity of the outfall. This reduction was most evident in the Phaeophyceae and the Rhodophyceae. The maximum value of algal species diversity was also reducted at higher levels above MLW, near the outfalls and away from the platform edge. (Ensign-PAI)
W73-10249

INDICATOR SPECIES--A CASE FOR CAUTION,
University Coll. of North Wales, Bangor. Marine Science Labs.
For primary bibliographic entry see Field 05B.
W73-10252

POLLUTION AND THE OFFSHORE OIL INDUSTRY,
British Petroleum Co. Ltd., Sunbury-on-Thames (England).
For primary bibliographic entry see Field 05B.
W73-10253

SECOND ANNUAL REPORT OF THE ADVISORY COMMITTEE ON OIL POLLUTION OF THE SEA. RESEARCH UNIT ON THE REHABILITATION OF OILED SEABIRDS.
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 05G.
W73-10255

RESPIRATION AND RESISTANCE TO ANAEROBIOSIS OF FRESH-WATER ALGAE, (IN GERMAN),
Vienna Univ. (Austria).
M. Dokulil.
Int Rev Gesamten Hydrobiol. Vol 56, No 5, p 751-768, 1971. English summary.
Identifiers: *Algae, *Anaerobiosis, Necrosis, *Respiration, Temperature, Water pollution effects.

Several species of unicellular and filamentous freshwater algae were studied. Both cultured forms and species gathered in the field were utilized. Respiration was measured by means of a Warburg apparatus. The effect of anaerobiosis on subsequent respiration was examined. Anaerobiosis was obtained by bubbling N2 through the medium. Most of the algae adapted their intensity of respiration to sudden changes in the concentration of environmental O2. After a considerable period without O2, respiratory rates up to 500% above that of the controls were measured. When anaerobic conditions prevailed too long, however, the algae became necrotic, and did not recover. The blue-green algae tested could exist for 10 days without O2, but none of the other types could exist more than 48 hr, and most of them by no means this long. When temperatures were elevated, the resistance to anaerobiosis was lessened.--Copyright 1973, Biological Abstracts, Inc.
W73-10365

STATE OF THE CARDIOVASCULAR SYSTEM OF MEN AFTER LONG-TERM USE OF CHLORIDE DRINKING WATER, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
A. I. Bokina, V. K. Fadeeva, and E. M. Vikhrova.
Gig Sanit. Vol 37, No 3, p 10-14, 1972. Illus. English summary.
Identifiers: *Cardio vascular system, *Chlorides (Drinking water), Diseases, Hypertension, Salination, Water pollution effects, *Potable water.

The state of the cardiovascular system was studied in persons drinking highly mineralized water for a long time. The constant use for drinking purposes of water was high content of NaCl is hazardous for the onset of hypertensive disease. If the chloride content of water is above the level of 1 g/l (chlorine-ion), the mineral composition of water should be corrected by desalination.--Copyright 1973, Biological Abstracts, Inc.
W73-10370

ON THE QUESTION OF ECOLOGICAL MAIN FACTORS IN TESTACEA ASSOCIATIONS,
W. Martin.
Limnologica. Vol 8, No 2, p 357-363, 1971.
Identifiers: Ecological studies, Moisture, *Testacea, *Biotopes, Reviews.

Areview is given of the literature on whether moisture or food is the major determining factor in the spread of Testacea, particular in secondary biotopes. Nutrition may be the major factor in determining their presence in such associations with moisture as a limiting factor. The Testacea of the secondary biotope are euryplastic with respect to moisture. Detritus is the main food of the moss and swamp Testacea.--Copyright 1972, Biological Abstracts, Inc.
W73-10379

EXPERIMENTAL STUDIES OF SUBSTANTIATING HYGIENIC STANDARD VALUES OF M--DIISOPROPYLBENZOL AND P-DIISOPROPYLBENZOL IN WATER BODIES, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
A. M. Sologub, and T. P. Bogdanova.
Gig Sanit. Vol 36, No 9, p 18-21, 1972. Illus. English summary.
Identifiers: *Benzols (Diisopropyl), *Hygienic standards, Water quality standards, *Isomers, Mice.

Isomers impart a specific smell to water but have no significant effect on the sanitation of water bodies. The effect of the substances on mice with long-term intake of water manifested itself mainly in pathologies of the central nervous system and the protein forming functions of the liver. The hyeienic standard level for both substances in water should be set at a level of 0.05 mg/l.--Copyright 1972, Biological Abstracts, Inc.
W73-10380

A CONTRIBUTION TO THE CHEMICAL AND MICROBIOLOGICAL STUDY OF WATER--CATCHMENT SYSTEMS IN CONNECTION WITH DECREASED YIELD DURING OPERATION, (IN SERBO CROATIAN),
V. Vajgand, J. Vucetic, M. Stojanovic, D. Babac, and M. Zdraveski.
Mikrobiologija (Belgr). Vol 7, No 2, p 139-148, 1970.
Identifiers: Catchments, Chemical studies, *Gallionella-Sp, *Leptothrix-Sp, Microbiological studies, *Siderocapsa-Sp, *Iron bacteria.

The incrustation of drains with iron from the water as a result of growth of iron-sustained bacteria (Leptothrix sp., Gallionella sp. and Siderocapsa sp.) decreased their specific yield. The presence of these bacteria is due to the combination of increased ferrous ions and CO2, with decreased oxygen in wells.--Copyright 1972, Biological Abstracts, Inc.
W73-10386

THE WATER DIVIDER AND REPRODUCTIVE CONDITIONS OF VOLGA STURGEON, (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Astrakhan (USSR).
For primary bibliographic entry see Field 08I.
W73-10393

PHENOL-AND RHODANE DESTRUCTING MICROFLORA AS A FACTOR FOR NATURAL PURIFICATION OF THE DNIEPER RESERVOIRS, (IN RUSSIAN),
Dnepropetrovskii Gosudarstvennyi Universitet (USSR).
A. K. Stolbunov.
Gidrobiol Zh. Vol 7, No 2, p 11-19. 1971. Illus. English summary.
Identifiers: *Dnieper reservoirs, *Micro flora, Phenols, Reservoirs, Rhodane, USSR, *Self-purification, *Bacterial.

Investigations carried out in summer 1968-1969 showed that phenol- and rhodane-destructing bacteria are constantly present in the basin. They possess the highest biochemical activity in places of discharge into the basin of sewage from the sources of phenol and rhodanide contamination. Moving off the source of contamination during the processes of natural self-purification, the phenol-destructing ability of water decreased up to the backround values in 50 km at an average and rhodane-destructing ability of water in 10-20 km. Mathematical-statistical analysis showed the positive moderate correlation of phenol-destructing ability of water and content of phenol-destricting bacteria in it, especially in the upper and most contaminated plots of reservoirs as well as the positive strong correlation of an amount of saprophytic and phenol-destructing bacteria in water. Phenol- and rhodane-destructing microflora and the physicochemical processes are important factors of self-purification of basins from contamination by phenols and rhodanides.--Copyright 1972, Biological Abstracts, Inc.
W73-10394

LETHAL DROPS IN HYDROSTATIC PRESSURE FOR JUVENILES OF SOME FRESH-WATER FISH, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Evolutionary Morphology and Animal Ecology.
V. I. Tsvetkov, D. S. Pavlov, and V. K. Nezdolii.
Vopr Ikhtiol. Vol 12, No 2, p 344-356. 1972. Illus.
Identifiers: *Hydrostatic pressure, *Lethal limit, Acipenser-baeri, Carassius-carassius, Coregonus-albula, *Fish (Juveniles), Leucaspius-delineatus, Perca-fluviatilis, Phoxinus-phoxinus, Rutilus-rutilus, Water pollution effects.

The effect of the amount and rate of drops in hydrostatic pressure were investigated for Leucaspius delineatus, Phoxinus phoxinus, Carassius carassius, Perca fluviatilis, Acipenser guldenstadti, Acipenser baeri, Rutilus rutilus, Coregonus albula, Dalmo salar, Alburnus alburnus and Thymalus thymallus. Sharp drops in pressure caused death not only in physoclistics, but also in physostomous fishes which had adapted to conditions of increased pressure. The rate of decrease was more critical for survival than the absolute decrease in pressure. An increase in the pressure drop above the rate of decompression caused severe trauma and death. The maximum rate of decompression was close to 0.9 atm/sec for the physostomous fishes and was much lower for physoclistics. Young juveniles with a swim bladder were more sensitive to pressure drops than older juveniles. It was concluded that the death of a large number of juveniles (11-67%) during downstream migration across the turbines of a high pressure hydroelectric power station resulted from decreased pressure in the turbines, especially in fishes which had adapted to increase pressure conditions in the head bay.--Copyright 1973, Biological Abstracts, Inc.
W73-10395

CONTRIBUTIONS TO THE KNOWLEDGE OF THE ALGAE OF THE ALKALINE ('SZIK') WATERS OF HUNGARY. III. THE PHYTOSESTON OF THE ALKALINE PONDS NEAR KUNFEHERTO,
Damjanich Muzeum, Szolnok (Hungary). Laboratorium Tisza-Forsch.
For primary bibliographic entry see Field 02H.
W73-10397

5D. Waste Treatment Processes

WATER AND WASTEWATER MANAGEMENT IN DAIRY PROCESSING,
North Carolina State Univ., Raleigh. Dept. of Food Science.
For primary bibliographic entry see Field 05B.
W73-09755

WATER TREATMENT BY MEMBRANE ULTRAFILTRATION,
North Carolina State Univ., Raleigh. School of Engineering.
J. A. Palmer, H. B. Hopfenberg, and R. M. Felder.
Available from the National Technical Information Service as PB-220 685, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency, Report EPA-R2-73-109, May 1973. 66 p, 18 fig, 2 tab, 39 ref. EPA Project 17010 EDR.

Descriptors: *Waste water treatment, *Surfactants, *Reverse osmosis, *Surface tension, *Semipermeable membrane, Membrane processes, Water treatment, Separation techniques, Sulfonates, Soaps, Detergents.
Identifiers: *Concentration polarization, *Flux-limiting effects, *Solute asymmetry, Ultrafiltration.

The effect of solute asymmetry and in turn solute surface activity on flux-limiting membrane interactions was studied in a 6 cell, duplex, continuous flow-through ultrafiltration test loop. Triton X-100, sodium dodecylbenzenesulfonate, and Carbowax 600 were chosen as the model nonionic surfactant, anionic surfactant, and nonionic symmetrical solute respectively. The presence of low concentrations of surface active agents in aqueous ultrafiltration feeds significantly reduced the steady-state trans-membrane flux. The nonionic surfactant and the anionic surfactant interacted with a polysalt membrane, causing maximum flux reductions of 24% and 20% respectively. The nonionic surfactant interacted with a cellulose acetate membrane, causing a maximum flux decline of 25%. The smallest flux reduction, of the order of 5%, was observed for the anionic surfactant interacting with the cellulose acetate membrane. In all but one case the distilled water flux returned to its original value consequent to a distilled water rinse following ultrafiltration in the presence of surface-active solute. There was essentially no observable flux decline associated with the ultrafiltration of Carbowax 600 solutions with the cellulose acetate membrane. A 5% flux reduction was observed during ultrafiltration experiments on these same solutions with the polysalt complex membrane. These composite results suggest that at least for the specific systems studied, solute asymmetry and in turn surface activity contributes specifically to flux-limiting membrane interactions. (EPA)
W73-09758

COST ESTIMATING GUIDELINES FOR WASTEWATER TREATMENT SYSTEMS,
Bechtel Corp., San Francisco, Calif.
J. W. Porter, G. W. Brothers, and W. B. Whitton.
Environmental Protection Agency Report EPA-R2-73-237, May 1973. 92 p, 1 fig, 7 tab, 48 ref. EPA Project 17090 DRU.

Descriptors: *Estimated costs, *Annual costs, *Capital costs, *Maintenance costs, *Operating costs, *Waste water treatment, Cost analysis, Cost trends, Electric power costs, Fuels, Financial analysis, Government finance, Interest rate, Wages, Water costs.
Identifiers: *Guidelines, Manuals.

This manual provides guidelines for the cost estimator concerned with various waste water treatment systems now under investigation by the Federal Water Quality Administration. Direction is given for the uniform presentation of capital and annual cost data now being developed. Individual sections deal with suggested forms for submitting reports, including an outline, and method and format for preparing capital and annual cost estimates for FWQA studies. The following specific data are appended: Summary of cost indices useful in scaling capital costs of previous years to present Description of typical operating cost data; sources of additional data Discussion of municipal bonds and financing Discussion of levels of estimates and expected accuracies. (EPA)
W73-09759

PRELIMINARY WATER AND WASTE MANAGEMENT PLAN.
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 06A.
W73-09813

WATER AND WASTEWATER FOR BROWARD COUNTY, FLORIDA.
Benham-Blair and Affiliates of Florida, Inc. Fort Lauderdale.
For primary bibliographic entry see Field 06B.
W73-09816

HUD SEWER POLICY IN URBAN RENEWAL AREAS,
Paterson Redevelopment Agency, N.J.
For primary bibliographic entry see Field 06E.
W73-09820

COOLING PONDS - A SURVEY OF THE STATE OF THE ART,
Hanford Engineering Development Lab., Richland, Wash.
J. C. Sonnichsen, Jr., S. L. Engstrom, D. C. Kolesar, and G. C. Bailey.
Report HEDL-TME 72-101 September 1972. 109 p, 14 fig, 16 tab, 129 ref, append. AEC-AT (45-1)-2170.

Descriptors: *Cooling water, *Heat transfer, *Ponds, *Design criteria, *Model studies, *Cost analysis, Electric power production, Thermal powerplants, Heated water, Discharge (Water), Thermal pollution, Cooling, Structural engineering, Stratification, Design, Theoretical analysis, Analytical techniques, Mathematical models, Evaluation, Spraying, Economics, Environment, *Reviews, Wast water treatment.

A review of cooling pond technology is presented in which major emphasis was placed on examination of engineering and environmental aspects of design, mathematical and physical modeling, use of sprays, and economics. The design of a cooling pond is affected by the local climatic, topographic, and hydrologic characteristics of the specific site. Construction methods rely on embankments to form an artificial water body or floating partitions to establish a pond in a larger body of water. Surface area, volume and depth are the main considerations of design as heat loss to the atmosphere is the main cooling factor. Methods for both theoretical and practical modeling are presented along with the equations necessary. Advantages associated with cooling ponds are service as a settling basin for suspended solids and operation for extended periods without make-up water. The economic aspects of cooling ponds include the commercial and recreational possibilities of such facilities. (Jerome - Vanderbilt)
W73-09849

LARGE SCALE SPRAY COOLING,
Richards of Rockford, Inc., Ill.
R. B. Kelley.
Industrial Water Engineering, Vol 8, No 7, p 18-20, Aug-Sept 1971. 3 fig.

Descriptors: *Spraying, *Heated water, *Heat transfer, Hydraulic engineering, *Cooling, Cooling water, Sprays, *Water cooling, Ponds, Electric power production, Thermal power plants, Air-water interfaces, Structural design, Temperature, Model studies, Theoretical analysis, Equations, Waste water treatment.

The use of spray cooling of heated water is discussed and compared to cooling towers for economy and efficiency. It has been shown that spray devices which produce fine droplets (less than 100 microns in diameter) achieve greater thermal dissipation than cooling towers. Previously, the energy which was required to operate spray systems made them uneconomical. But, now, proper nozzle and pump selection can create more economical systems. The performance of a spray system depends upon droplet size. Drift loss must be considered in design. Some pump and head combinations are discussed. To calculate comparative efficiency, wet bulb temperature must be converted into enthalpy units and certain saturation conditions must be assumed. Equations for calculating the number of transfer units for a mechanical spray device and the total heat dissipation for a given spray nozzle are given. (Jerome - Vanderbilt)
W73-09850

SPINNING DISCS: A BETTER WAY TO COOL POND WATER,
J. Papamarcos.
Power Engineering, Vol 75, No 9, p 54-57, September 1971. 4 fig.

Descriptors: *Cooling, *Heated water, *Thermal pollution, Thermal powerplants, Powerplants, Heat transfer, Waste water treatment, Temperature, Prototypes, Ponds, *Sprays.
Identifiers: *Cooling ponds, *Spinning discs cooling system.

A new cooling system shows promise of being effective and versatile enough to meet many different operating requirements. The cooling device was developed by Cherne Industrial, Inc., and 23 utilities have joined with the company to help finance a demonstration project. Spray is formed by a spinning disc which is 24 in. in diameter by 1/4 in. thick. In an operating system it is expected that up to 50 discs would be assembled on a single shaft to make up what is called a Thermal Rotor. Several of these rotors might be joined together to be driven by a single electric motor. Variable-speed hydraulic motors, rather than electric motors, might also be used to drive the rotors. This would make it possible to vary the cooling rate and to reduce drift during high-wind conditions. The demonstration project is set up in a holdup basin near Stillwater, Minn. with nine floating units which will operate year-round with the rotors in various modes. (Oleszkiewicz-Vanderbilt)
W73-09853

REMOVAL OF CHROMATE FROM COOLING TOWER BLOWDOWN BY REACTION WITH ELECTRO-CHEMICALLY GENERATED FERROUS HYDOXIDE,
Los Alamos Scientific Lab., N. Mex.
E. I. Onstott, W. S. Gregory, and E. F. Thode.
Environmental Science and Technology, Vol 7, No 4, p 333-337, April 1973. 5 fig, 4 tab, 16 ref.

Descriptors: *Waste water treatment, *Cooling towers, *Chemical precipitation, *Chromium, *Electrolysis, Chemical engineering, Thermal power plants, Chemical reaction, Electrochemistry, Effluents, Phosphates, *Thermal pollution.

A new method of treating cooling tower blowdown water utilizing electrochemically generated ferrous hydroxide as a reducing agent is reported. This method quantitatively reduced Cr (VI) to Cr (III) and concurrently precipitated it without pH adjustment. Concentrations of Cr (VI) of <0.005 mg/l. were achieved. Ferrous hydroxide treatment also precipitated a large fraction of the phosphate and other anions to improve product effluent quality significantly with respect to total dissolved solids. Steady-state generation of ferrous hydroxide in blowdown was accomplished with high Faraday efficiency in a flow cell which utilized sacrificial low carbon steel anodes and stainless steel cathodes. Colloids were formed under most electrolysis conditions, and special procedures were required to obtain filterable precipitates. (Jerome-Vanderbilt)
W73-09854

HELLER DISCUSSES HYBRID WET/DRY COOLING,
Eotvos Lorand Univ., Budapest (Hungary).
L. Heller.
Electrical World, Vol 179, No 6, p 74-77, March 1973. 4 fig.

Descriptors: *Cooling towers, *Design criteria, *Environmental engineering, *Cost analysis, *Mathematical studies, Electrical power production, Thermal power plants, Cooling, Heated water, Heat transfer, Structural design, Systems analysis, Optimization, Economics, Thermal pollution, Waste water treatment.

Two new factors affecting cooling system design are the possibility of generation capacities up to 3000 or 4000 Mw and the fact that environmental considerations preclude the consumption of the fresh water supplies necessary for such facilities if present cooling systems are used. A method is described that enables the employment of a system of condensation by means of air in cases where water costs are high, with full consideration of environmental protection aspects, without detriment to the economy of electrical power production, and which in given cases provides greater economy than wet cooling. This system is a combination of wet and dry cooling which provides a logical solution to environmental problems in locations where peak loads occur in the summer. The dry section of the cooling tower is operated in the winter and the wet section in the summer. A mathematical study of the economy of the hybrid system using data from a power plant in the Southwest U.S. is presented. Dry cooling is the most expensive method in this case while wet cooling and a hybrid system are competitive. (Jerome-Vanderbilt)
W73-09855

WET-TYPE HYPERBOLIC COOLING TOWERS,
Alfred A. Yee and Paul Rogers, Inc., Los Angeles, Calif.
For primary bibliographic entry see Field 08F.
W73-09857

COOLING WATER,
Drew Chemical Corp., Parsippany, N.J.
R. M. Silverstein, and S. D. Curtis.
Chemical Engineering, Vol 78, No 18, p 84-94, August 9, 1971. 10 fig.

Descriptors: *Cooling water, *Cooling, *Waste water treatment, Corrosion, Heat transfer, Hardness (Water), Water pollution, Fouling, Suspended solids, Temperature, Thermal powerplants, Thermal pollution, Algicides.
Identifiers: *Corrosion inhibitors.

Two general problems caused by cooling water in process-plant design and operation are discussed: deposits, which can form on surfaces over which water flows, and which can subsequntly interfere with heat transfer and continuous flow; and corrosion, which can destroy equipment for handling the cooling water. Impurities in water associated with treatment problems are hardness, iron, silica, oil, dissolved gases, microbiological matter and suspended matter. Treating costs for once-through, open circulating and closed cooling systems are compared. Corrosion inhibitors such as chromate ions, phosphates, zinc ion, sodium silicates, organic inhibitors, nitrities, and borax are used in cooling systems, along with dispersant, preventing the agglomeration of colloidal particles and their attraction to metal surfaces. Biocides are extensively used for control of biological life in the system. (Oleszkiewicz-Vanderbilt)
W73-09861

LOW GRADE HEAT FROM THERMAL ELECTRICITY PRODUCTION, QUANTITY, WORTH AND POSSIBLE UTILIZATION IN SWEDEN,
Swedish Board for Technical Development, Studvik (Sweden).
For primary bibliographic entry see Field 05G.
W73-09865

PROCESS FOR TREATING WASTE EFFLUENT,
Minnesota Mining and Manufacturing Co., St. Paul. (assignee).
R. Fisch, and N. Newman.
U.S. Patent No 3,721,624, 2 p, 2 ref; Official Gazeytt of the United States Patent Office, Vol 908, No 3, p 692, March 20, 1973.

Descriptors: *Patents, *Toxicity, Pollution abatement, *Waste water treatment, Water quality control, Water pollution control, Biochemical oxygen demand.
Identifiers: *Chemical treatment, Oxidizing agents, Peroxy compounds, Hydrogen peroxide, Peroxydisulfate.

An oxidizing agent is added to the photographic fix solution to oxidize thiosulfate to sulfate. The oxidized fix solution is added to the spent color developer. The phenylene diamine is thereby isolubilized, forming a sludge which is easily removed. Three oxidizing agents were tested: perozy compounds, hydrogen peroxide, and potassium peroxydisulfate. (Sinha-OEIS)
W73-09926

PROCESS FOR THE BIO-OXIDATION OF NITROGEN DEFICIENT WASTE MATERIALS,
R. K. Finn, and A. L. Tannahill.
U.S. Patent No 3,721,622, 6 p, 4 ref; Official Gazette of the United States Patent Office, Vol 908, No 3, p 692, March 20, 1973.

Descriptors: *Patents, Liquid wastes, Organic wastes, *Waste water treatment, Pollution abatement, Water quality control, *Nitrogen fixation, Molybdenum, *Aeration, Microorganisms, Nutrients.
Identifiers: *Bio-oxidation, Vanadium.

Basically the process for the bio-oxidation of nitrogen-deficient aqueous organic waste consists of feeding the waste into an aeration zone containing: an active culture comprising at least 75 percent by weight of cells of aerobic, free-living nitrogen fixing microorganisms; a sufficient amount of nutrients to maintain growth of the cell (0.01 ppm molybdenum or vanadium); and at least 0.01 atmospheres of dissolved oxygen. The aeration zone is maintained at a temperature of about 20C to 40C and a pH of about 6 to 9. Retention time might range from 3 to 12 hours. Ten examples are presented to illustrate variations in this invention. (Sinha-OEIS)
W73-09928

MICROBIAL BIOLYSIS PROCESS,
E. G. Smith, and J. W. Hood.
US Patent No 3,718,582, 5 p, 4 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 4, p 1042, February 27, 1973.

Descriptors: *Patents, Liquid wastes, Solids, *Heat treatment, *Biological treatment, *Microbial degradation, Water pollution control, Water quality control, Pollution abatement, *Waste water treatment.
Identifiers: *Biolysis.

This system includes an aerobic biological oxidation step wherein a mixed liquor is formed that contains purified suspending liquid and biologically active solid matter suspended within it. Purified suspending liquid is the effluent from the process. Portions of the sludge are heated to 140 to 212F and held at that temperature to effect non-toxic microbial biolysis. The material is made biologically inactive and is usable as food for the remaining active organisms. The portion subjected to biolysis is so regulated that substantially all of the biodegradable matter is consumed and only a relatively small quantity is removed to final disposal. (Sinha-OEIS)
W73-09929

PROCESS FOR TREATING AQUEOUS CHEMICAL WASTE SLUDGES AND COMPOSITION PRODUCED THEREBY,
Corson (G. and W. H.), Inc., Plymouth Meeting, Pa. (Assignee).
C. L. Smith, and W. C. Webster.
US Patent No 3,720,609, 7 p, 1 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 908, No 2, p 431, March 13, 1973.

Descriptors: *Patents, *Chemical wastes, *Sludge treatment, *Sludge disposal, Pollution abatement, *Ions, *Waste water treatment, Landfills, Sulfates, Aluminum, Iron, Calcium, Magnesium.

Residual reactive materials, including sulfate ions, aluminum ions, iron ions, calcium ions and magnesium ions or sources of these ions present in various forms in the sludge, are reacted with ion yielding aluminum compounds, lime and soluble sulfates, added when necessary to raise the concentrations of these materials in the sludge above certain minimum levels, to produce a composition which will harden over a period of days or weeks. This material may be used as a land fill or base material or be otherwise easily disposed. (Sinha-OEIS)
W73-09932

METHOD AND APPARATUS FOR CONDITIONING AND DISPOSING OF ALUM SLUDGE FROM WATER TREATMENT,
Bonham, Grant and Brundage Ltd., Columbus, Ohio. (Assignee).
J. D. Stauffer.
US Patent No 3,720,608, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 908, No 2, p 431, March 13, 1973.

Descriptors: *Patents, *Sludge treatment, *Dewatering, Equipment, Water quality control, Water pollution control, Pollution abatement, *Waste water treatment.
Identifiers: *Alum sludges.

This apparatus consists of a holding tank which receives solids from clarification settling tanks, a system of heat exchangers for heat recovery and auxiliary heat application to raise the temperature of the incoming sludge, a detention vessel to provide for a required reaction time, a decant tank, and a dewatering unit for separation of the solids from the conditioned sludge. The alum sludge is subjected to a temperature of about 212F for a period of about 30 minutes. The solids are separated from the liquid to produce a low moisture content sludge cake. (Sinha-OEIS)
W73-09933

DEODORIZING AND SEWAGE TREATMENT FORMULATION,
Biogenics Co., Inc., Greensboro, N.C. (Assignee).
R. E. Horney, and H. T. Jackson.
US Patnet No 3,720,606, 4 p, 5 ref; Official Gazette of the United States Patent Office, Vol 908, No 2, p 431, March 13, 1973.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Bacteria, Odor, *Aerobic treatment.
Identifiers: *Odor suppressants, Bacillus.

The formulation combines the features of an improved odor suppressing or masking agent with a

novel bacterial agent, the latter induces aerobic decomposition of the odor producing matter to a form free of odor. The masking agent includes a perfumant dissolved in a film-forming carrier to form a barrier or shield between the waste and the atmosphere. The formulation comprises a solution containing one or more aerobic, mesophilic, spore-forming bacterial agents chosen from Group 1 of the genus Bacillus to induce aerobic decomposition. (Sinha-OEIS)
W73-09934

PERIPHERAL FEED AND EFFLUENT SYSTEM FOR SEDIMENTATION TANKS,
Rex Chainbelt Inc., Milwaukee, Wis. (Assignee).
W. H. Boyle.
US Patent No 3,717,257, 5 p, 8 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 907, No 3, p 710, February 20, 1973.

Descriptors: *Patents, *Waste water treatment, Sedimentation, Hydraulic gradients, Pollution abatement, Water pollution control, Water quality control, *Settling basins.

Adjoining feed and effluent channels are of complementary dimensions. Their combined width is uniform but their diminishing widths provide the required hydraulic gradients. The sedimentation tank has a single horizontal shelf projecting inward. The shelf is of uniform width and an upright wall at its inner periphery forms the overflow weir of the tank. An inner scum baffle is uniformly spaced in the weir and is concentric with the vertical axis of the rotating sludge removal mechanism at the center of the tank. (Sinha-OEIS)
W73-09942

LIQUID CLARIFICATION UNIT,
Bauer Bros. Co., Springfield, Ohio. (Assignee).
R. P. Rowland, and D. P. Michel.
US Patent No 3,717,255, 6 p, 3 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 907, No 3, p 710, February 20, 1973.

Descriptors: *Patents, *Water purification, Separation techniques, *Settling basins, *Waste water treatment, *Pollution abatement, Water quality control, Water pollution control.

This invention relates to a process of clarifying contaminated liquids and to the simplified separation of liquids from solids. It consists of a single compartment open tank, having a feed trough along one side to provide for the infeed. Turbulence is avoided for quick settling of heavy solids. Bridging the lateral extent of the tank are riffly plates mounted on a continuous chain. The plates are continuously moved along the bottom to pick up the solid contaminants and lead them away for separate discharge. Clarified liquid is directed from the tank under pressure. (Sinha-OEIS)
W73-09943

METHOD AND APPARATUS FOR FILTERING SOLIDS,
Q. L. Hampton.
US Patent No 3,717,251, 9 p, 15 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 907, No 3, p 709, February 20, 1973.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Filtration, Pollution abatement, Water quality control, Water pollution control, Equipment, Filters.

A washing system utilizes the hydraulic characteristics created by the use of two greatly different volumes of water flow when filtering and washing within a discharge trough of fixed dimensions. Different velocities created in the discharge of the water carrying trough above the filter media produce two different flow trajectories and proper location of a baffle in a discharge receiving area permits complete separation of filtered water flow from washwater flow. The filter is cleaned by increasing the rate at which the water flows through the filter media. No devices are required to control fluidizing of the bed except volumetric flow to the unit during washing. Dispersion of air bubbles in the washwater supply to the filter during washing operations does not agitate the filter bed to the extent that filter media is lost in the washwater. Upon leaving the filter media, the filtered liquid flows over a weir and into an effluent trough from where it is directed outward for suitable disposition. (Sinha-OEIS)
W73-09944

NEUTRALIZATION OF WASTE WATERS BY BETTER EXPLOITATION OF RAW MATERIAL DURING PRODUCTION OF POTATO STARCH,
J. Haeusler, and J. Malcher.
Staerke. Vol 24, No 7, p 229-235. 1972. Illus. English summary.
Identifiers: *Fermentation, *Neutralization, *Potato starch, Industrial wastes, Waste water treatment, Coagulation.

Neutralization of fruit juice released during potato starch production can be efficiently accomplished in 2 steps. The first is based on protein coagulation at 85 degrees C in an acidic medium. The acid fermentation step in methane fermentation is used. Heterogeneous lactic acid fermentation is the main process occuring here. Coagulated protein may be efficiently processed into feed, making waste water purification more profitable. The second step is methane fermentation. At loads higher than the fermentation tank's maximum load of 1.5 kg/m3, the period of fermentation is shortened enough to make anaerobic processes impossible. During fermentation, 15.25 m3 of fermentation gas/m3 raw water is produced, with a methane content of 54%. This quantity should be sufficient for heating the waste water to the temperature needed for coagulation. Fruit juice fermentation must be followed by a 1-hr period of mud sedimentation to make purification more effective. With this method, the fruit juice concentration is decreased enough that it can be further purified, along with the processing water, in a biological activation filter plant.--Copyright 1973, Biological Abstracts, Inc.
W73-10087

CHEMICAL AND PHYSICAL ALTERATIONS OF HOUSEHOLD WASTE DURING BIOTHERMAL DISINFECTION IN EXPERIMENTAL DIGESTION CELLS AT THE INSTITUTE FOR MUNICIPAL ADMINISTRATION, DRESDEN, (IN GERMAN),
P. Czerney.
Z Gesamte Hyg Grenzgeb. Vol 18, No 2, p 90-93. 1972. Illus.
Identifiers: Digestion cells, *Disinfection (Biothermal), Germany, Microorganisms, Thermal, *Waste treatment, *Domestic wastes (Household).

Continuous temperature measurements and gas analyses, pH, dry substance, water content and capacity, loss on burning, carbon and nitrogen content, and density were determined. Household waste was ground and sieved and put in stirred digestion cells where the action of microorganisms developed heat and produced CO2. The fresh material was weakly alkaline, 35% water and 26% organic with 0.8% N. The output was more homogeneous, had less water and C but the same N content. The dry weight decreased 10%. The density was higher together with the water capacity. Disinfection succeeds best with low pH and lower water content.--Copyright 1973, Biological Abstracts, Inc.
W73-10088

ACTIVITIES OF THE CORPS OF ENGINEERS IN MARINE POLLUTION CONTROL,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
For primary bibliographic entry see Field 05G.
W73-10103

A PRELIMINARY STUDY OF BACTERIAL POLLUTION AND PHYSIOGRAPHY OF BEIRUT COASTAL WATERS,
American Univ., Beirut (Lebanon). Dept. of Biology.
For primary bibliographic entry see Field 05B.
W73-10119

STUDY OF VARIOUS POSSIBLE DESIGNS FOR WATER INTAKE AND OUTLET SYSTEMS OF LARGE POWER STATIONS, CONSIDERING HYDRUALIC PLANT OPERATING PROBLEMS AND SITE SUITABILITY (QUELQUES CONSIDERATIONS SUR LE CHOIX DU SYSTEME P RISE-REJET DES GRANDS AMENAGEMENTS THERMIQUES SELON LEUR LOCALISATION),
Laboratoire National d'Hydraulique, Chatou (France).
For primary bibliographic entry see Field 05G.
W73-10147

WHY CORROSION PRODUCTS MUST BE CONTROLLED IN POWER PLANT WATERS,
Battelle-Pacific Northwest Labs. Richland, Wash.
For primary bibliographic entry see Field 08G.
W73-10182

REMOVAL OF CHROMATES FROM PROCESS COOLING WATER BY THE REDUCTION AND PRECIPITATION PROCESS,
Union Carbide Corp., Paducah, Ky. Paducah Plant.
E. W. Richardson.
Available from NTIS, Springfield, Va., as Ky-641; $4.00 in paper copy, $0.95 in microfiche. Report KY-641, Sept 1972. 22 p, 3 fig, 4 tab, 2 ref.

Descriptors: *Chromium, *Cooling towers, *Waste water treatment, Pollution abatement, *Reduction (Chemical), Filtration, *Chemical precipitation, Flocculation, Zinc, Phosphates, Feasibility studies, Cost analysis.

Pilot plant tests favored either ferrous sulfate or sodium sulfite rather than an iron-filing bed for reduction of Cr (6+) to Cr (3+). The advantages were a smaller system size (to provide adequate retention time and surface area) and elimination of problems with regard to channeling and passivation. Passivation resulted in part from collection of hydrogen gas on the surface of the filings. After reduction at pH 2.2-3.0, hydrolytic precipitation by lime to adjust pH to 8.5-9.0 reduced Cr and phosphates to less than 0.1 ppm and Zn to less than 1 ppm. Average water content of the filtered sludge was 93%. (Bopp-ORNL)
W73-10199

CONDITIONS FOR THE REMOVAL OF CHROMATE FROM COOLING WATER,
Paducah Gaseous Diffusion Plant, Ky.
A. J. Lemonds.
Available from NTIS, Springfield, Va., as KY-642; $4.00 in paper copy, $0.95 in microfiche. Report KY-642, July 1972. 10 p, 2 fig, 4 tab, 2 ref.

Descriptors: *Chromium, *Cooling towers, *Waste water treatment, *Pollution abatement, Reduction (Chemical), Filtration, Chemical precipitation, Zinc, Phosphates, Feasibility studies, Cost analysis, Chemical engineering, Laboratory tests, *Thermal pollution.

Laboratory studies showed that adjustment of the pH of cooling water blowdown to pH 3.0 by sulfuric acid addition, reduction of Cr (6+) by a 10% excess of ferrous sulfate, followed by precipitation with lime at pH 9 removed Cr to 0.02 ppm. The effect of pH on the residual Cr (6+) in the reduction step was greater than predicted by a theory involving simplifying assumptions. No improvement was found by using a higher pH for precipitation. Cost estimates are given. (Bopp-ORNL)
W73-10207

THE DESIGN OF A ONCE-THROUGH COOLING SYSTEM TO MEET THE CHALLENGE OF STRICT THERMAL CRITERIA,
Long Island Lighting Co., Mineola, N.Y. Environment Engineering Dept.
M. C. Cordaro, and D. L. Matchett.
Journal of Environmental Systems, Vol 2, No 3, p 207-223, September 1972. 7 fig, 1 tab, 11 ref.

Descriptors: *New York, Coasts, *Nuclear powerplants, *Thermal pollution, *Discharge, *Diffusion, *Waste dilution, Tidal effects, Currents, Hydraulic models, Model studies, Numerical analysis, On-site tests, *Waste water treatment.
Identifiers: Shoreham Nuclear Power Station, Once-through discharge system, Multiport diffuser.

A unique approach which combined mathematical analysis, field investigation, and hydraulic model studies was used to generate the data necessary for the design of the once-through discharge system for the Shoreham Nuclear Power Station. A multiport diffuser with 65 submerged outlets which discharge horizontally along a 3,800 ft line perpendicular to the principal current direction, starting about 1,600 ft offshore, was developed to satisfy the coastal waters thermal criteria for New York State. Dye studies were used to determine far-field heat return to the discharge area resulting from reversing tidal currents. Hydraulic model studies provided essential information in the dilution capability of a diffuser system in shallow water and under the influence of transient currents. The model studies also defined the near-field temperature buildup at the time of tidal current reversal. (Ensign-PAI)
W73-10239

SAR ORDER RHEINWERFT OIL REMOVAL PLANT.

South African Shipping News and Fishing Industry Review. Cape Town, Vol 27, No 10, p 20, October 1972.

Descriptors: *Oil, Oil spills, *Cleaning, *Separation techniques, Equipment, Basins, Centrifugal pumps, Design, Waste water treatment, *Treatment facilities.
Identifiers: *Rheinwerft oil removal plant, *Table Bay (South Africa).

A Rheinwerft oil removal plant for Table Bay, South Africa, is described. The plant separates two liquids of different specific gravities, with the lighter liquid floating on the surface of the heavier, and is usually employed to remove oil spills from the waters of harbors, rivers, and other inland areas. The system comprises a basin held in the water by three floats. Water is continuously pumped out from the bottom of the basin by a centrifugal pump. (Ensign-PAI)
W73-10240

BIOXIDATION OF WASTE IN ACTIVATED SLUDGE: I. MEASURING OXYGEN RESPIRATION OF ACTIVATED SLUDGE BY MEANS OF POLAROGRAPHIC AND OXYGEN PROBE METHODS,
For primary bibliographic entry see Field 05A.
W73-10387

5E. Ultimate Disposal of Wastes

DEEP WELL DISPOSAL STUDY FOR BALDWIN, ESCAMBIA, AND MOBILE COUNTIES, ALABAMA.
Geological Survey, University, Ala.

Prepared for the South Alabama Regional Planning Commission. Geological Survey of Alabama Circular 58, June 1970. 49 p, 8 fig, 10 maps, 1 tab, 1 append. HUD Ala. P-63 (G).

Descriptors: *Deep wells, *Waste water disposal, *Injection wells, Geology, Hydrology, Environmental effects, Alabama.
Identifiers: Baldwin County (Alabama), Escambia County (Alabama), Mobile County (Alabama).

A study of the potential use of deep wells for the disposal of liquid wastes is presented. The area is a 3-county region including the highly industrialized Mobile metropolitan area. This area is underlain by sedimentary rocks of the type used for deep well disposal in other areas of the country. The study describes the theory of deep well injection of liquid wastes, looks at the geology of the area in detail, and discusses other important factors such as hydrology, chemical aspects, the nature of the wastes, and the economics involved. There are several potential zones for deep-well injection for certain types of industrial wastes. These zones meet the criteria for safe waste disposal and generally contain water that is not suitable for human use. There is still a need for more data, especially for more analyses of water from deep wells in these zones. Deep well injection proposals must be studied carefully to prevent environmental damage. (Elfers-North Carolina)
W73-09817

ST. LOUIS REGION WATER AND SEWERAGE FACILITIES SUPPLEMENT NUMBER 1 - PROGRAMMING,
East-West Gateway Coordinating Council, St. Louis, Mo.
L. D. Leitner.
June 1972. 59 p, 3 fig, 4 append. HUD EWG-LL-0199.08.0.

Descriptors: *Planning, *Water supply, *Sewerage, Financing, Coordination, Priorities, Missouri.
Identifiers: St. Louis Region, Policy review.

This report is one in a series of water and sewerage reports from a continuing planning program being carried out by the East-West Gateway Coordinating Council for the St. Louis region. It is basically a revision of a previous report, St. Louis Region Water and Sewerage Facilities. The emphasis is on establishing a priority rating system for existing and proposed water supply and sewage treatment facilities. The ratings are based on projecting the year that the facilities would become overloaded. Cost estimates for proposed facilities and some general observations and recommendations are also discussed. The major problems noted include a great shortage of funds for construction, the probable inability to formulate the federally required Water Quality Management Plan by the deadline, and the great number of local agencies which complicate review and coordination procedures. There is no indication that the situation revealed by the evaluation of water and sewer facilities within the region will improve in the future. Appendices provide data on water supply and sewage treatment inventories, evaluations of existing facilities, and impacts of proposed projects. (See also W71-00421) (Elfers-North Carolina)
W73-09826

METROPOLITAN COMPREHENSIVE WATER, SEWAGE, AND SOLID WASTE PLANNING STUDY.
Bi-State Metropolitan Planning Commission, Rock Island, Ill.
For primary bibliographic entry see Field 06A.
W73-09829

STUDY ON: ATOMIC RESIDUES IN THE DEEP SEA, (PREOCUPACAO: RESIDUOS ATOMICOS NO FUNDO DO MAR),
C. R. Schroth.
Revista Nacional da Pesca. Sao Paulo. Vol 12, No 102, p 14-16, November 1970.

Descriptors: *Bottom sediments, *Radioisotopes, *Underground storage, *Safety, Water pollution sources, Nuclear energy, Byproducts, Brine disposal, Water pollution control.

Dangerous materials are enclosed in lead boxes and placed in the salt deposits on the ocean floor. The subterranean salt deposits will eventually be transformed into radioactive residue because of the by-products given off in the production of atomic energy. It was concluded in 1965-67 by North American scientists that radioactive materials can be stored safely in ocean floor salt deposits. (Ensign-PAI)
W73-09900

LOCAL SCOUR UNDER OCEAN OUTFALL PIPELINES,
Montgomery (James M.), Inc., Pasadena, Calif.
For primary bibliographic entry see Field 08A.
W73-09902

SEWAGE DISPOSAL IN THE TURKISH STRAITS,
Woodward-Envicon, Inc., San Diego, Calif.
For primary bibliographic entry see Field 05B.
W73-09904

SUBSURFACE WASTE STORAGE--THE EARTH SCIENTIST'S DILEMMA,
Geological Survey, Denver, Colo.
R. W. Stallman.
In: Underground Waste Management and Environmental Implication, Proc of Symposium held at Houston, Tex, Dec 6-9, 1971: Tulsa, Okla, American Association of Petroleum Geologists Memoir 18, p 6-10, 1972. 20 ref.

Descriptors: *Waste disposal wells, *Injection wells, *Underground waste disposal, Water chemistry, Kinetics, Dispersion, Water pollution effects, Water pollution sources.

Some of the possible consequences of underground waste injection are (1) groundwater pollution, (2) surface-water pollution, (3) changes in rock permeability, (4) subsidence, (5) earthquakes, and (6) mineral-resource pollution. Although much work has been done to predict some of the effects, the current state of knowledge is not adequate to estimate them accurately. Knowledge of dispersion, nonlinear relations between rock stress and strain, and interrelations of hydraulics, heat, chemistry, and rock mechanics at macroscale is especially deficient for application to the waste problem. Advances in chemical thermodynamics and kinetics of geochemistry may provide improved technology. (Knapp-USGS)
W73-10022

INJECTION WELLS AND OPERATIONS TODAY,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
For primary bibliographic entry see Field 05B.
W73-10023

RESPONSE OF HYDROLOGIC SYSTEMS TO WASTE STORAGE,
Geological Survey, Washington, D.C. Water Resources Div.
For primary bibliographic entry see Field 05B.
W73-10025

CIRCULATION PATTERNS OF SALINE GROUNDWATER AFFECTED BY GEOTHERMAL HEATING--AS RELATED TO WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 05B.
W73-10028

NATURAL-MEMBRANE PHENOMENA AND SUBSURFACE WASTE EMPLACEMENT,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10035

GEOCHEMICAL EFFECTS AND MOVEMENT OF INJECTED INDUSTRIAL WASTE IN A LIMESTONE AQUIFER,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 05B.
W73-10036

TRENDS IN MARINE WASTE DISPOSAL, GOOD AND BAD,
Engineering-Science, Inc., Pasadena, Calif.
H. F. Ludwig, J. R. Thoman, and P. N. Storrs.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C., 1972. p 105-130, 9 ref, 1 tab.

Descriptors: *Waste disposal, *Environmental effects, *Planning, *Economics, Temperature, Dissolved oxygen, Suspended solids, Oil, Nutrients, Bacteria, Pesticides, Sedimentation, Benthos, Light, Water quality standards, Regulations, Legislation.

The overall objective in planning for marine waste disposal is to provide an economical means of disposal with minimum adverse effects on the environment. The first problem is essentially technical in nature: the problem of defining the effects of waste waters and their constituents on the marine environment, and the paucity of scientific parameters available for making such assessments. A second problem is defining 'adverse effects' in any given situation. Temperature, DO, pH, suspended solids, floatables, oil, grease, nutrients, metals, bacteria and pesticides are considered along with changes in light transmission, benthic organisms and sediment characteristics. The current trend in marine water quality standards appears to shortcut essential investigation and research and to establish the answers by legislative or regulatory fiat. In most cases this will result either in uneconomical utilization of resources or in less than maximal protection of environmental resources. (See also W73-10098) (Ensign-PAI)
W73-10105

OCEANOGRAPHIC SURVEYS FOR DESIGN OF POLLUTION CONTROL FACILITIES,
Engineering-Science, Inc., Berkeley, Calif.
D. L. Feuerstein.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 175-183.

Descriptors: *Surveys, *Oceanography, Water pollution control, *Waste water disposal, Facilities, *Outlets, Application methods, Dispersion, Dilution, Ecosystems, Environmental effects, *Design.
Identifiers: Predesign, Predischarge, Postdischarge.

Oceanographic surveys for waste water disposal systems can be placed in one of three general categories: predesign, predischarge and postdischarge. Three objectives must be satisfied in the conduct of a predesign oceanographic survey: must determine dispersion of diluting characteristics of the receiving waters; must provide sufficient information on the ecosystem in the proposed discharge area to assure that biologically significant or sensitive areas will not be adversely affected by the disposal system; and must determine foundation conditions for outfall and diffuser placement prior to preparation of engineering plans and specifications of the waste disposal system. Predischarge surveys are conducted to establish the baseline or natural conditions of the receiving waters, receiving sediments and adjacent shoreline prior to discharge of waste waters. Postdischarge surveys are monitoring programs conducted for the purpose of determining the effects of a discharge on the receiving environment. (See also W73-10098) (Ensign-PAI)
W73-10107

THE OCEAN: OUR COMMON SINK,
Norske Videnskaps-Akademi i Oslo.
For primary bibliographic entry see Field 05C.
W73-10126

GROUNDWATER QUALITY IN THE CORTARO AREA NORTHWEST OF TUCSON, ARIZONA,
For primary bibliographic entry see Field 05B.
W73-10332

5F. Water Treatment and Quality Alteration

PRELIMINARY WATER AND WASTE MANAGEMENT PLAN.
Metcalf and Eddy, Inc., Boston, Mass.
For primary bibliographic entry see Field 06A.
W73-09813

COMPREHENSIVE AREA-WIDE WATER AND SEWER PLAN.
Robert and Co. Associates, Atlanta, Ga.
For primary bibliographic entry see Field 06A.
W73-09814

WATER AND WASTEWATER FOR BROWARD COUNTY, FLORIDA.
Benham-Blair and Affiliates of Florida, Inc. Fort Lauderdale.
For primary bibliographic entry see Field 06B.
W73-09816

ST. LOUIS REGION WATER AND SEWERAGE FACILITIES SUPPLEMENT NUMBER 1 - PROGRAMMING,
East-West Gateway Coordinating Council, St. Louis, Mo.
For primary bibliographic entry see Field 05E.
W73-09826

MUNICIPAL WATER SYSTEMS - A SOLUTION FOR THERMAL POWER PLANT COOLING,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. G. Hansen, C. R. Knoll, and B. W. Mar.
Journal of the American Water Works Association, Vol 65, No 3, p 174-181, March 1973. 5 fig, 1 tab, 14 ref.

Descriptors: *Thermal power plants, *Heated water, *Water distribution, *Potable water, *Heat transfer, Discharges (Water), Theoretical analysis, Computer models, Model studies, Temperature, Water temperature, Water quality control, Impoundments, Piping systems, Thermal pollution.

An analysis of the possibility of discharging power plant waste heat into a drinking water system was conducted for the transmission system and the distribution grid. The hypothesis was that heated water could be discharged into drinking water transmission mains. General heat loss calculations were made for both flowing and stagnant water in buried pipes. Except with very low flows, large diameter and medium diameter pipes experienced very little temperature loss. Results indicate that major changes are required before an existing water-supply and distribution system can be employed as a sink for waste heat from a thermal-power generating facility. There would be marginal costs or benefits from integrating the water supply system with power plant cooling if the heat was rejected at less than 100F (40C). High rejecting temperatures would not create benefits for the water user. (Jerome-Vanderbilt)
W73-09851

WATER HEATING AND PURIFICATION SYSTEM,
Pollution Research and Control Corp., Glendale, Calif. (Assignee).
For primary bibliographic entry see Field 03A.
W73-09936

PARTICLE SEPARATOR AND METHOD,
A. S. King.
US Patent No 3,718,256, 3 p, 2 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 907, No 4, p 964, February 27, 1973.

Descriptors: *Patents, Ions, *Nucleation, *Crystallization, *Electric fields, *Water purification, *Demineralization, Polarity, Water treatment.

Particle separation is provided by using electric fields to create polarizing action within the water solution to free unwanted ions from water molecule clusters to permit formation of ionic crystals by nucleation or coagulation. An electrically conductive surface is maintained at ground potential at a temperature which differs from the fluid to be treated. The fluid is directed against the surface and the particles collect on it. The particles are thereafter washed off and then separated by settling as a sediment which may then be removed by scraping. (Sinha-OEIS)
W73-09937

DEVICE FOR RECLAIMING SWEET WATER FROM SEA WATER OR BRACKISH WATER,
Siemens A.G., Munich (West Germany). (Assignee).
For primary bibliographic entry see Field 03A.
W73-09941

SAMPLER-CULTURE APPARATUS FOR THE DETECTION OF COLIFORM BACTERIA IN POTABLE WATERS,
For primary bibliographic entry see Field 05A.
W73-09945

CHARACTERISTICS OF DISTRIBUTION OF FLUORINE IN WATERS OF THE STEPPE REGIONS OF KAZAKHSTAN IN RELATION TO ENDEMIC FLUOROSIS, (IN RUSSIAN),
For primary bibliographic entry see Field 05B.
W73-09990

PUBLIC WATER SUPPLIES OF SELECTED MUNICIPALITIES IN FLORIDA, 1970,
Geological Survey, Tallahassee, Fla.
For primary bibliographic entry see Field 04B.
W73-10319

STATE OF THE CARDIOVASCULAR SYSTEM OF MEN AFTER LONG-TERM USE OF

CHLORIDE DRINKING WATER, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-10370

EXPERIMENTAL STUDIES OF SUBSTANTIATING HYGIENIC STANDARD VALUES OF M--DIISOPROPYLBENZOL AND P-DIISOPROPYLBENZOL IN WATER BODIES, (IN RUSSIAN),
Institute of General and Municipal Hygiene, Moscow (USSR).
For primary bibliographic entry see Field 05C.
W73-10380

ATTITUDES TOWARDS WATER FLOURIDATION IN TURKU, (IN FINNISH),
Turku Univ. (Finland).
H. Vuori.
Suom Hammaslaak Toim, Vol 67, No 4, p 235-242, 1971. English summary.
Identifiers: *Attitudes, Economic aspects, *Finland (Turku), *Fluoridation, Health care, Water treatment, Potable water.

The opinions on water fluoridation within a random sample of 300 inhabitants of Turku were investigated. The initial hypothesis was that in Finland the attitudes towards health care play a far more important role in the development of fluoridation attitudes than do general sociological and psychological theories. However, since socio-psychological attitudes, especially alienation and radicalism-conservatism, strongly influenced the attitudes towards fluoridation in other countries, these factors were included as independent variables in the present study. Only 20% of the respondents fully or partly agreed with the view that fluorine should be added to the drinking water in Turku. Only 57% of the respondents had heard about water fluoridation. Only the social status of the respondent and the total income of his family correlated positively with fluoridation approval. The knowledge about fluoridation effects was vague and did not influence attitudes towards water fluoridation. The supporters of fluoridation best separated from its opposers through their attitudes towards propositions pertaining directly to fluoridation, such as fluoridation is compulsory medication and fluoridation interferes with individual rights. The differential capacity of components relating to health culture was quite poor. Those persons, however, who subjectively experience that both their general health and their dental conditions are good, and who, in their own opinin, have taken good care of their health, apparently support prophylactic health care and fluoridation. Alienation and radicalism-conservatism in this study did not correlate to approval of fluoridation.--Copyright 1972, Biological Abstracts, Inc.
W73-10385

BACTERIOLOGICAL FINDINGS IN LAKE, RIVER AND WELL WATER SUPPLIES OF RANGOON,
Institute of Medicine (I), Rangoon (Bruma). Dept. of Microbiology.
For primary bibliographic entry see Field 05A.
W73-10391

5G. Water Quality Control

AIR INJECTION AT LAKE CACHUMA, CALIFORNIA,
Geological Survey, Menlo Park, Calif. Water Resources Div.
M. W. Busby.
Geological Survey Water Resources Division open-file report, 1973. 31 p, 12 fig, 3 tab, 18 ref.

Descriptors: *Thermodynamic behavior, *Aeration, *Lakes, *California, *Thermocline, Destratification, Limnology, Reservoirs, Thermal stratification, Data collections, Evaporation, Water quality, Chemical analysis.
Identifiers: *Lake Cachuma (Calif), Air injection in lakes, Air injection effects.

A 4-year study was undertaken to determine the effects of air injection on Lake Cachuma, Santa Barbara County, Calif. Lake Cachuma has a capacity of 205,000 acre-feet and was nearly full through most of the study period. The preliminary investigations at Lake Cachuma and studies at other lakes indicated that the use of air injection would be economically feasible in reducing undesirable tastes and odors, increasing dissolved oxygen in the hypolimnion, and reducing evaporation rates. The primary purpose of air injection--elimination or reduction of thermal stratification--was achieved only partially. The greatest effect of the air injection was on temperature distribution, but the test did not produce a totally destratified reservoir. The density barriers to complete mixing were not eliminated. The dissolved-oxygen stratification was only moderately affected, and the nutrient distribution was unaffected by the air injection. No undesirable phytoplankton blooms occurred. No change could be detected in evaporation rates. The air injection did not have an adverse effect on the physical, chemical, or biological conditions of the lake. Possibly a different and larger scale injection program might prove beneficial. (Woodard-USGS)
W73-09799

PROJECTIONS OF WATER USE AND CONSERVATION IN THE USSR, 2000 (ORIYENTIROVOCHNYY PROGNOZ ISPOL'ZOVANIYA I OKHRANY VODNYKH RESURSOV SSSR NA UROVNE 2000 G.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 06B.
W73-09804

COMPREHENSIVE AREA-WIDE WATER AND SEWER PLAN.
Robert and Co. Associates, Atlanta, Ga.
For primary bibliographic entry see Field 06A.
W73-09814

A QUALITY CONTROL STUDY FOR A NEW WATERSHED,
Denver Water Board, Colo.
C. G. Farnsworth.
Public Works, Vol 102, No 11, p 61-62, November 1971. 2 photos, 1 tab.

Descriptors: *Planning, *Water supply, *Watersheds, *Water quality, Diversion, Diversion tunnels, Colorado.
Identifiers: Denver (Colorado).

A water quality study for potential watersheds to be used for water supply for Denver, Colorado, is described. Denver and its metropolitan area have developed most of the nearby surface water and are now planning to use watersheds in the Rocky Mountains. The watersheds in question, the Eagle, Piney, and Ten Mile, are on the western slope of the Rockies, and the water would have to be diverted through the mountains in tunnels. The study is particularly concerned about the water quality in these watersheds as compared to the water in the receiving reservoirs of the Denver system. Field studies were made of the water quality covering such parameters as pH, turbidity, chlorides, hardness, and coliforms. The new streams were of better quality than the potential receiving reservoir. Continual testing is necessary to monitor possible changing conditions. (Elfers-North Carolina)
W73-09815

PROGRAM DESIGN FOR PLANNING WATER QUALITY MANAGEMENT IN KENTUCKY RIVER BASINS.
Schimpeler-Corradino Associates, Louisville, Ky.; and Schimpeler-Corradina Associates, Lexington, Ky.
For primary bibliographic entry see Field 06B.
W73-09825

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN,
Duncan and Jones, Berkeley, Calif.; and Yoder-Trotter-Orlob and Associates, Berkeley, Calif.
For primary bibliographic entry see Field 06D.
W73-09828

COMPUTER LANGUAGES FOR ENGINEERS,
New Mexico State Univ., University Park. Dept. of Chemical Engineering.
H. G. Folster, and D. B. Wilson.
Journal of the American Water Works Association, Vol 65, No 4, p 248-254, April 1973. 4 fig, 5 tab, 35 ref.

Descriptors: Engineering, *Computer programs, *Waste water (Pollution), *Simulation analysis, Mathematical models, Systems analysis, Digital computers.

Now through computer simulations, many variations, process configurations and cases can be examined in the engineering analysis of waste water systems. Many engineers desire to use the capabilities of the computer but do not because they are unfamiliar with machine language. Moreover, with so many computer languages available today, the engineer needs guidance in choosing the best one for a particular situation. This article examines the types of computer languages and their use in waste water system analysis. The information flow through a digital computer--which occurs in three phases: programming, translation, and execution--is described to aid in understanding the types of machine interaction. The programming phase probably has been the principal deterent to widespread use of the computer by non-computer oriented engineers since it involves learning a new language. The various levels of programming languages and computer languages at each level are discussed, including procedure- and problem-oriented languages operations using numerical quantities or alphabetical character strings, comparision of problem-oriented languages classed as either 'computer aids' to design or 'computer-aided' design languages, and finally, nomenclature and glossary terms. For engineers interested in learning to use computers, references are made to instructional manuals for the various levels of computer languages in use today. (Bell-Cornell)
W73-09834

ESTIMATION THEORY APPLICATIONS TO DESIGN OF WATER QUALITY MONITORING SYSTEMS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
S. F. Moore.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY 5, Proceedings paper No 9755, p 815-831, May 1973. 8 fig, 6 tab, 9 equ, 12 ref.

Descriptors: *Water quality control, *Monitoring, *Stochastic processes, *Data collections, *Estimating, Hydraulics, Water quality standards, Economics, Optimization, Costs, Management, Mathematical models, *Design, Systems analysis, Equations, Aquatic environment.
Identifiers: *Data systems, Filtering techniques.

The objectives of water quality control are quantified in water quality standards, and enforcement of standards is the feedback mechanism for quality control. To achieve effective control, engineers need a knowledge of the state of the aquatic

ecosystem. The necessary information is obtained from monitoring or data collection programs and an understanding of the phenomena involved (a model). A quantitative methodology, utilizing Kalman filtering techniques, is developed for designing water quality monitoring systems. A basis is established for: (1) Improvement of current practices of specification and enforcement of water quality standards; and (2) evaluating the economic trade-off between temporal and spatial frequency of sampling. Monitoring systems are characterized by spatial and temporal frequency of sampling and the variables to be measured. Utilizing a dynamic model of the aquatic environment and estimates of the uncertainty in model error and measurement error, a best sampling program is selected from a set of feasible sampling programs by sequentially minimizing a specified measurement system cost function. An optimal solution is not guaranteed. The power of the technique is based on the unique combination of model and data obtained from filtering techniques. The major shortcomings are: (1) The need for a model of the systems and (2) high computer costs. (Bell-Cornell)
W73-09837

THERMAL CAPACITY OF OUR NATION'S WATERWAYS,
Westinghouse Hanford Co., Richland, Wash.
D. E. Peterson, J. C. Sonnichsen, Jr, S. L. Engstrom, and P. M. Schrotke.
Journal of the Power Division, American Society of Civil Engineers, Vol 99, No PO1, Proceedings paper No 9736, p 193-204, May 1973. 6 fig, 3 tab, 16 ref.

Descriptors: *Simulation analysis, River basins, *Thermal pollution, Watersheds (Basins), *Computer programs, Environmental engineering, Water pollution, Numerical analysis, Cooling, Mississippi River, Missouri River, Colorado River, Systems analysis, Mathematical models, Water temperature.
Identifiers: *Thermoelectric power generation, *Once-through cooling systems.

A study made to assess the thermal capacity of rivers within the contiguous United States is described. Formats used by both the Geological Survey and Federal Power Commission delineate study basins; within each basin, projected power growth is compared to computed capacities. The siting of powerplants and the use of once-through cooling systems are subjects of major controversy. In some regions there still exists a considerable capacity for once-through cooling of steam electric power stations. A methodology for assessing this capacity is discussed in hopes of placing the potential for once-through cooling in the proper perspective. Capacities are computed using simulation models. The capacity calculations are based upon conditions of low and average flow. The calculations are contrained by imposing the appropriate water temperature standards. The effect of maximum temperatures is considered by analyzing long-term temperature records wherever available. A number of basins are found to possess suitable capacity for siting additional thermoelectric power plants. More detailed examination may prove this capacity is nonexistent. Projected power through the year 1990 is considered. (Bell-Cornell)
W73-09840

OPTIMIZATION OF CIRCULATING WATER SYSTEM,
Worcester Polytechnic Inst., Mass.
R. S. Gupta, and B. R. Webber.
Journal of the Power Division, American Society of Civil Engineers, Vol 99, No PO1, Proceedings paper No 9756, p 235-247, May 1973. 5 fig, 5 tab, 9 equ, 6 ref, 5 appen.

Descriptors: Computers, *Nuclear powerplants, *Cooling towers, *Condensers, *Optimization, *Thermal pollution, Water supply, Water temperature, Flow, Pumps, Cooling water, Rivers, Atmosphere, Vermont, Connecticut River, Steam.
Identifiers: *Circulating water systems, Iterative procedures.

Due to strict thermal standards, utilities are forced to look for efficient and economic methods of removing waste heat from steam electric generating plants. A code is presented for optimizing the circulating water system such that requirements imposed by state and Federal Authorities are not violated. Two large cooling towers, a 135-acre cooling pond and the circulating water system are coupled together. The major savings realized as a result of this code are: (1) a minimization of the number of operating circulating water pumps, circulating water booster pumps, and cooling water fans; (2) a maximization (within limits) of the amount of heat rejected to the river; and (3) a minimization of unit heat rate consistent with existing conditions and limitations. (Bell-Cornell)
W73-09842

MUNICIPAL WATER SYSTEMS - A SOLUTION FOR THERMAL POWER PLANT COOLING,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05F.
W73-09851

THE CASE FOR THERMAL POLLUTION,
Wisconsin Univ., Madison.
G. F. Lee, and C. Stratton.
Industrial Water Engineering, Vol 9, No 6, p 12-16, Oct-Nov 1972. 3 tab.

Descriptors: *Thermal pollution, *Effluents, *Water quality standards, *Cooling towers, Water pollution, Discharges (Water), Electric power production, Thermal powerplants, Cooling, Cooling water, *Lake Michigan, Potable water, Aquatic life, Chemical analysis, Water treatment, *Beneficial use, Reasonable use.

A discussion is presented of the expected chemical composition of cooling tower blowdown water from a thermoelectric plant, and the potential water quality problems that may exist should cooling towers be required to meet the thermal effluent standards. Data gathered from Commonwealth-Edison from the Lake Michigan waters near the Zion installation are used as being representative of cooling tower make-up water, and consideration is given to the chemicals which are added for treatment of cooling tower water. Ammonia, boron, cadmium, chloride, copper, iron, mercury, nitrate, hexane soluble oil, phenols, phosphorus, sulfate, suspended solids and zinc are all discussed briefly, and seen as approaching the limits allowed for lake and effluent water as a result of cooling tower operation. Although cooling towers will relieve the problem of thermal pollution it is clear that others will result from periodic blowdowns. In many cases the thermal difficulties may be much smaller than those related to their solution. (Jerome-Vanderbilt)
W73-09864

LOW GRADE HEAT FROM THERMAL ELECTRICITY PRODUCTION, QUANTITY, WORTH AND POSSIBLE UTILIZATION IN SWEDEN,
Swedish Board for Technical Development, Studvik (Sweden).
J. Christensen.
Aktiebolaget Atomenergi Report AE 448, April 1972. 101 p, 8 fig, 9 tab, 115 ref.

Descriptors: *Heated water, *Heat flow, *Water utilization, *Beneficial use, *Electric power production, Wastes, Cooling water, *Thermal pollution, Thermal powerplants, Cost analysis, Economics, Equations, Sewage treatment, Distillation, Evaporation, Circulation, Aquiculture.

In a thermal-cycle working process entropy is degraded from one temperature to a lower temperature, T (2). The discharge of heat at T (2) is an inescapable part of the process; if the entropy flow is S the flow of this degradation heat is S x T (2). The ratio of heat flow to mechanical power, or in an electric generating plant, the cooling/electricity power ratio, may be influenced in several ways. But, radical changes can hardly be expected, even with fusion power. Swedish degradation heat flow is estimated to be 70GW plus or minus 14GW in the year 2000. The pricing of heat from a combined plant is and must be arbitrary. A pricing method based on energy coupled to the electricity market is chosen here. Low grade heat at temperatures above that of the cooling outlet from electricity-only plants is not cost free. Among the ways of utilizing low-grade heat considered are distillation of sewage, heating soil, green houses and water for aquaculture and chemical processes. (Jerome-Vanderbilt)
W73-09865

COMPUTER SIMULATION OF GROUND WATER AQUIFERS OF THE COASTAL PLAIN OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 02F.
W73-09871

POLLUTION POTENTIAL OF RUNOFF FROM PRODUCTION LIVESTOCK FEEDING OPERATIONS IN SOUTH DAKOTA,
South Dakota State Univ., Brookings. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-09872

FEASIBILITY STUDIES IN WATER RESOURCE PLANNING,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 06B.
W73-09877

SUPPOSED TOXICITIES OF MARINE SEDIMENTS. BENEFICIAL EFFECTS OF DREDGING TURBIDITY,
Resources and Ecology Projects, Inc., San Francisco, Calif.
J. F. Gustafson.
World Dredging and Marine Construction, Vol 8, No 13, p 44-52, December 1972. 6 fig, 3 tab, 23 ref.

Descriptors: *Dredging, *Turbidity, *Clays, *Sediments, Marine animals, *Clams, *Adsorption, Pollutants, Oil, Sewage, Pesticides, Chemicals, Metals, Polychlorinated biphenyls, Suspension.
Identifiers: Resuspension.

The ability of clay to remove materials out of the water column is considerable. The longer the period of suspension the greater will be the success of removal. Oils, pesticides, sewage pollutants (with the exception of nitrates), and metals are all stripped or scrubbed from the water by the clay sediments. As the clays fall and become bottom sediments, the materials which have been stripped out are almost completely isolated. The difference in concentrations of metals between sediment and water illustrates the adsorptive capacity of the sediments and proves their importance in the removal of these chemicals from the water. An experiment was designed to test the effectiveness and the permanence of the adsorption and the results show that resuspension of bay sediments caused an increased removal of the metals from the water. Pesticides and PCB followed the action of the metals. The short-time resuspension of sediments such as might occur during dredging or even during disposal in confirmed areas will not produce an excessive growth of algae. Results indicate that organic molecules

are not liberated when resuspended in amounts sufficient to cause ecological concern. An experiment to determine if marine organisms could or would digest metals and pesticides from clay particles was conducted using clams. The results were not conclusive. (Ensign-PAI)
W73-09880

BARTOW MAINTENANCE DREDGING: AN ENVIRONMENTAL APPROACH,
G. T. Gibson, and E. C. Simpson.
World Dredging and Marine Construction, Vol 8, No 13, p 54-60, December 1972. 3 fig.

Descriptors: *Channels, *Dredging, *Silting, Water quality control, Application methods, Turbidity, Environmental effects, Control, Programs, *Florida.
Identifiers: *Tampa Bay (Bartow Channel).

From January to August 1972 dredging operations were performed in the Bartow channel of Tampa Bay in Florida. Nearly half a million cubic yards of silt were removed to return the channel to its original depth. The project was focused at reducing the environmental impact of dredging operations. Three general methods were incorporated: hydraulic dredging equipment with a cutting head and a suction line, a silt retention apparatus, consisting of curtain devices placed around the dredge and supported by flotation buoys, and spoil retention areas consisting of a sequence of spoil holding ponds connected by spillways. A water quality control program enforced rigid controls during the whole operation to insure minimum environmental impact. (Ensign-PAI)
W73-09881

HYDRAULIC MODELS PREDICT ENVIRONMENTAL EFFECTS.
For primary bibliographic entry see Field 08B.
W73-09883

THE GREAT LAKES CLEAN-UP,
Gemini News Service, London (England).
C. Sanger.
Marine Pollution Bulletin, London, Vol 3, No 9, p 138-139, September 1972.

Descriptors: *Great lakes, *Water quality control, *Cleaning, Sewage, Outlets, Industrial waste, Oil, Pesticides, Herbicides, Phosphorus, Mercury, Nutrients, United States, Canada.

An agreement signed in Canada by President Nixon commits Canada and the U.S. to spend 3,500 million dollars over five years for de-polluting the Great Lakes. There are different forms of pollution; the worst being the sewage effluent and industrial waste from cities like Detroit and Cleveland. Others are: mercury, oil and human excreta, the dumping in open waters of toxic materials and waste dredged up from harbor mouths, and the pesticides and herbicides that flow into the waters from farmlands. The major concentration of the clean-up campaigns has been the removal of phosphorus, as it is seen as the most controllable of the nutrients on which the aquatic weeds and algae thrive. Due to several problems on phosphorus control the American side is likely to direct their efforts to building improved sewage treatment plants. They will be trying to stop pollutants at the outlets into the lakes, rather than (as Canadians will be doing) at the source. (Ensign-PAI)
W73-09892

ARTIFICIAL RADIOACTIVITY IN FRESH WATER AND ESTUARINE SYSTEMS,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Radiobiological Lab.
For primary bibliographic entry see Field 05B.
W73-09893

WATER QUALITY STUDIED ON TEXAS GULF COAST,
Texas A and M Univ., College Station. Dept. of Civil Engineering.
R. W. Hann, Jr., and J. F. Slowey.
World Dredging and Marine Construction, Vol 8, No 13, p 30-34, December 1972. 7 fig, 2 tab.

Descriptors: *Texas, *Estuaries, *Water quality control, *Dredging, Oil, Sedimentation rate, Heavy metals, Copper, Zinc, Lead, Chromium, Cadmium, Mercury, Gulf of Mexico, *Metals.
Identifiers: Environmental modification, Environmental pollution, Grease, Oxygen demanding organic material, Organic carbon.

The Texas Gulf Coast is an estuarine system which has undergone substantial environmental modifications and which in places is subjected to excessive levels of environmental pollution. The study has as its first objectives the quantitative and qualitative evaluation of sediment materials, determining the overall mass balance of oxygen demanding organic material, the rate of sedimentation and the oil and grease content. Additional quality parameters considered are: heavy metal content of the sediments, including copper, chromium, zinc, lead, cadmium and mercury and total organic carbon. Data were obtained for the Houston Ship Channel, and five additional estuaries including the Neches, Sabine, Brazos, the San Bernard Estuaries, and the Corpus Christi Ship Channel. Recommendation is made that the dredging industry more carefully document its position, with regard to environmental modification and environmental pollution with special consideration given to coastal bays, marshes and estuaries. (Ensign-PAI)
W73-09894

PROBLEMS OF THE CASPIAN,
For primary bibliographic entry see Field 05C.
W73-09896

STUDY ON: ATOMIC RESIDUES IN THE DEEP SEA, (PREOCUPACAO: RESIDUOS ATOMICOS NO FUNDO DO MAR),
For primary bibliographic entry see Field 05E.
W73-09900

MARINE POLLUTION,
A. J. O'Sullivan.
Water Pollution Control, Vol 71, No 3, p 312-323, 1972. 39 ref.

Descriptors: *Coast, Pollutant identification, *Path of pollutants, *Water pollution control, Governments, Legislation, *Reviews.
Identifiers: *Legal jurisdiction, *United Kingdom (England).

The problem of coastal pollution in England is reviewed. The origin and growth of river and subsequently, coastal water, pollution is outlined. Major pollutants and their sources are described, including domestic and agricultural waste, industrial waste, oil, radioactive material, and heat. Current knowledge concerning the environmental effects of each of these same pollutants is summarized. Measures and methods used to control coastal pollution are discussed. The changing roles of the river authorities and the sea fisheries committees are traced. It is suggested that the control and regulation of all activities affecting the marine environment might be best handled by a single environmental agency. (Ensign-PAI)
W73-09905

WASTE DISPOSAL AND WATER QUALITY IN THE ESTUARIES OF NORTH CAROLINA,
North Carolina State Univ., Raleigh. Dept. Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-09911

REVIEW ON THE STATE OF MARINE POLLUTION IN THE MEDITERRANEAN SEA.
For primary bibliographic entry see Field 05B.
W73-09913

ENGINEERING COMMITTEE ON OCEANIC RESOURCES PROCEEDINGS OF THE FIRST GENERAL ASSEMBLY.
For primary bibliographic entry see Field 06E.
W73-09914

DESIGN OF A WORLD MONITORING SYSTEM,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
For primary bibliographic entry see Field 05A.
W73-09924

COAGULATION IN ESTUARIES,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 02L.
W73-09925

PROCESS FOR THE BIO-OXIDATION OF NITROGEN DEFICIENT WASTE MATERIALS,
For primary bibliographic entry see Field 05D.
W73-09928

COLLECTION AND DISPOSAL OF SHIP'S SEWAGE,
Department of the Navy, Washington, D.C.
C. W. Walker.
US Patent No 3,721,207, 2 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 908, No 3, p 589, March 20, 1973.

Descriptors: *Patents, *Sewage disposal, Ships, Water pollution control, Water quality control, Pollution abatement, *Waste water disposal.

A system is provided for collecting ships' discharges by running the discharges by gravity through a floating pipe into a submerged sewage pumping plant or a holding station from which it is pumped into a sewer system on shore. (Sinha-OEIS)
W73-09931

WELL PUMPING APPARATUS FOR POLLUTED WATER,
Mowid Anstalt, Vaduz (Liechtenstein). (Assignee).
L. Bood.
US Patent No 3,720,488, 3 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 908, No 2, p 405, March 13, 1973.

Descriptors: *Patents, Water pollution treatment, *Pumps, *Wells, *Pollution abatement, Water pollution control, Water quality control.

This invention comprises a well with one or more supply openings for polluted water and a discharge line for the water to be pumped and a pump. The pump housing is provided with a suction opening at the lower side which is connected with the polluted water collected in the well and it also has a discharge line. There is a removable portion (for cleaning) which consists of the electric motor, motor housing and an impeller. (Sinha-OEIS)
W73-09935

WAVE RIDING WATER BARRIER,
J. D. Harper.
US Patent No 3,718,001, 2 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 907, No 4, p 897, February 27, 1973.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Barriers, Water quality control, Water pollution control.

A floating water barrier is provided that is flexible not only in both vertical and horizontal planes. It is flexible in the sense of being able to ride wave slopes without tilting sharply from a vertical disposition. It consists of a strip of flexible material acting as a curtain, a ballast mass, and a pair of flexible buoyancy pockets formed in opposite sides of the strip at the edge opposite the ballast. The tops and bottoms of the pockets are secured to the strip. A float is placed in each of the pockets. The floats are formed of closed cell foamed plastics and are rectangular in cross section with the long side of the rectangle lying adjacent to the strip. (Sinha-OEIS)
W73-09939

REMOVAL OF PETROLEUM HYDROCARBONS FROM WATER SURFACES,
Pfizer Inc., New York. (Assignee).
J. Warren.
US Patent No 3,717,573, 3 p, 2 ref; Official Gazette of the United States Patent Office, Vol 907, No 3, p 784, February 20, 1973.

Descriptors: *Patents, *Iron oxides, Oil spills, *Oil pollution, *Pollution abatement, Water quality control, Water pollution control, Separation techniques, Wetting.
Identifiers: *Oleophilic substances, Magnetism.

A process of scavenging an oil layer on a body of water is disclosed. A comminuted ferromagnetic oleophilic substance is spread on the oil, and the agglomerates formed are removed by magnetic attraction. Seven examples are given to suggest variations in experimental application of the process. (Sinha-OEIS)
W73-09940

GROUNDWATER RESEARCH IN THE OPEN--CAST MINING AREA OF THE SOUTHERN NIEDERRHEIN-BUCHT (WEST GERMANY),
Geologisches Landesamt Nordrhein-Westfalen, Krefeld (West Germany).
For primary bibliographic entry see Field 02F.
W73-09951

PROBLEMS OF GROUNDWATER EXPLORATION IN METAMORPHIC ROCKS FOR DOMESTIC WATER SUPPLIES IN NORTHEASTERN BRAZIL,
Bundesforschungsanstalt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 02F.
W73-09952

EFFECT OF ARTIFICIAL AERATION ON SOME HYDROCHEMICAL INDICES OF WATER QUALITY, (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Hidrobiologii.
A. K. Ryabov, B. I. Nabivanets, Zh. M. Aryamova, E. M. Palamarchuk, and I. S. Kozlova.
Gidrobiol Zh. Vol 8, No 1, p 63-67. 1972. Illus. English summary.
Identifiers: *Aeration (Artificial), Algae, *Hydrochemical indices, USSR, Water quality, *Cyanophyta.

Data are presented on the effect of artificial aeration on O2 content, carbonic acid, pH, organic substances, organic C and N, mineral forms of N, and oxidizability of water. Aeration of the basin in the first turn results in destratification of O, creating favorable conditions for mineralization of organic substances in bottom layers of water. As a result of aeration mineralization of organic substances containing N and the development of blue-green algae are suppressed.--Copyright 1972, Biological Abstracts, Inc.
W73-10014

THE ENVIRONMENTAL MATRIX: INPUT-OUTPUT TECHNIQUES APPLIED TO POLLUTION PROBLEMS IN ONTARIO,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
T. R. Lee, and P. D. Fenwick.
Water Resources Bulletin, Vol 9, No 1, p 25-33, February, 1973. 5 tab, 13 ref.

Descriptors: *Input-output analysis, *Canada, *Heavy metals, Economic impact, Environmental effects, Industries, Water pollution control, Ecology, Mathematical models, Systems analysis, Water pollution sources.
Identifiers: *Ontario (Canada), Economic-ecologic linkages, *Residuals management, Compounds, Trace wastes, Iterative processes, Environmental quality.

The increased intensity of concern with problems of environmental quality and, particularly in Canada, the occurrence of a number of problems with specific industrial waste discharges of mercury, fluorides, oil, and others, has led to the focussing of attention on what might be termed trace wastes. Monitoring of the environment and wildlife has produced a partial account of the rapid increase in the amounts of many substances. But no real accounting of the rate of residual production has been made. Recently, emphasis is being placed upon the concept of waste production or residuals management, and many studies are focussing on constructing economic (particularly input-output) models. These studies attempt to link interrelationships between alternative pollution control measures and economic development with a key variable being the levels of residuals entering the environment. The environmental impact of various economic activities in Ontario has been investigated by means of input-output tables with emphasis on the use of certain materials in the production processes, rather than on the discharge of wastes from these processes. A brief discussion of the general utility of the input-output technique is made. Considerable emphasis is given to the background and methodology of this study, and specific deficiencies and strengths are examined. (Bell-Cornell)
W73-10020

EMERGENCY CONTROL, A NEW METHOD FOR PRODUCTIVITY STUDIES IN RUNNING WATERS, (IN GERMAN),
Max-Planck-Institut fuer Limnologie, Schlitz (West Germany). Limnologische Flusstation.
J. Illies.
Verh D Tsch Zool Ges. 65, p 65-69. 1971. English summary.
Identifiers: *Biomass, Emergency control, *Insects, Method, *Productivity studies, Running waters.

Quantitative records of the number and biomass of insect adults from a given area of running water courses were obtained by setting greenhouses over small streams. Comparing the results of emergence in 2 brooks one observes an outstanding equality of biomass, in spite of striking differences in numbers and species composition. The faunal differences are significant of the ecological character of the brooks. Emergence records of 3 subsequent years in the same place show a remote fluctuation of individuals in many species and sudden alterations in the abundance of others. The new method seems of considerable value for productivity studies and faunistic analysis in running waters.--Copyright 1973, Biological Abstracts, Inc.
W73-10078

COASTAL ZONE POLLUTION MANAGEMENT, PROCEEDINGS OF THE SYMPOSIUM.

Available from Office of Industrial and Municipal Relations, College of Engineering, Clemson University, Clemson, South Carolina 29631. Price: $8.00. Symposium held in Charleston, South Carolina, February 21-22, 1972. Clemson University, Clemson, South Carolina, B.Y. Edge, editor, 1972. 281 p.

Descriptors: *Coasts, *Southeast U.S., *Estuaries, *Water pollution control, *Management, Waste disposal, Water pollution sources, Programs, Environmental effects.

The purpose of the symposium was to bring together experts in coastal zone pollution management from throughout the United States so that there could be a mutual sharing of knowledge with those participants from the Southeast U.S. The symposium was intended to identify the important problems that the Southeast U.S. faces in coastal zone pollution management, explain the role of national, regional, state and local governmental agencies, and indicate available techniques for solution of these problems. (See W73-10099 thru W73-10111)
W73-10098

NATIONAL COASTAL POLLUTION PROGRAM,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
E. T. Jensen.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972. Clemson University, Clemson, S.C. 1972. p 11-19.

Descriptors: *Coasts, *Estuaries, *Water pollution control, *Pollution abatement, *Biological communities, *Balance of nature, Land, Freshwater, Saline water, Energy, Water utilization, Classification, Water quality standards, Standards.
Identifiers: Citizen awareness.

An important environmental concern is the pollution of estuarine areas and the open oceans. Many unique biosystems are found in estuarine areas. Estuarine systems have four distinct natural elements that must be kept in balance: land, fresh and salt waters, biosystems, and energy. The many and varied uses of our estuarine systems must also be kept in balance. The proper balance may be maintained by classifying each estuary as to the way it is used and an appropriate level of water quality established. The sources of estuarine pollution are man-made; therefore, it is man's decision whether or not abatement of estuarine pollution is possible. The environmental Protection Agency's Water Quality Standards Program is the basis of the nation's water pollution control effort; this program classifies bodies of water according to use, establishes pollutant limits, and sets implementation plans to abate further water pollution. Polluters are required to file pollutants discharged with the EPA. Public awareness and involvement both locally and nationally is a key factor to abatement progress. (See also W73-10098) (Ensign-PAI)
W73-10100

REGIONAL COASTAL POLLUTION CONTROL,
Environmental Protection Agency, Atlanta, Ga. Region IV.
J. E. Ravan.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 21-35.

Descriptors: *Coasts, *Estuaries, *Water pollution control, Pollutants, Water pollution sources,

*Industrial wastes, Environmental effects, Research, Training, Manpower, *Southeast U.S.
Identifiers: *Charleston (So.Car.), Gulf Coast River Basin.

A general view of the estuarine and coastal pollution problems confronted by the Region IV (Southeast) of the Environmental Protection Agency (EPA) is presented. Even if this region does not have as high a population concentration as others, it has an important industrial pollution problem compounded by its special physical characteristics: a very wide and shallow continental platform that precludes the fast dispersion of pollutants to the marine environment. Among the problem pollutants in waste discharge are the following: decomposable organic materials; pathogenic organisms; inorganic plant nutrients; industrial waste toxic materials; and heat, floating and sedimentary materials. Each of these has different deletereous effects on the estuarine environment. Studies of the Charleston area as well as of other smaller cities in the Gulf Coast River basin were conducted by the EPA, identifying the major pollution sources in local industries. The recommendations of a 1969 study of the IV Region of EPA on estuarine pollution are enumerated, all of them are concerned with the need for research in the basic physical, chemical and biological processes in estuaries. The need of continued support of academic research to guarantee the availability of trained manpower is emphasized. (See also W73-10098) (Ensign-PAI)
W73-10101

SOLUTION TO CONFLICT IN THE COASTAL ZONE: PART I--A NATIONAL COASTAL ZONE MANAGEMENT PROGRAM,
Virginia Inst. of Marine Science, Gloucester Point.
W. J. Hargis, Jr.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 37-65, 22 ref.

Descriptors: *United States, *Coasts, *Management, *Programs, *Planning, Legislation, Standards, Monitoring, Research and Development, Engineering, Manpower, Water quality standards.

The history of coastal zone management is reviewed, and the need for the development of a national coastal zone program is stressed. A national program should comprise planning, legislation, regulations, standards, monitoring, enforcement, basic and applied research, engineering development, technical assistance and advisory services. The governmental structure, management strategy, organization, and manpower of such a program are considered. (See also W73-10098) (Ensign-PAI)
W73-10102

ACTIVITIES OF THE CORPS OF ENGINEERS IN MARINE POLLUTION CONTROL,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
R. P. Tabb.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 67-84.

Descriptors: *Harbors, *Coasts, *Estuaries, Water pollution control, Engineering, Water resources, Dredging, Waste disposal, *Treatment facilities, *Oil spills, *Cleaning, Thermal pollution, Navigable waters, Regulation, Civil engineering, Water works, Construction, Design, Legislation, Rivers and Harbors Act.

The U.S. Army Corps of Engineers is involved in the total concept of water resources management and is concerned with certain aspects of pollution in the coastal zone. The Corps interest has a twofold aspect: that which is involved in studies, design and construction of Federal Civil Works projects and the regulation responsibilities in navigable waters of the United States. Model studies and investigations on sanitary waste disposal, floating waste treatment facilities, oil spills, harbor cleanup, thermal pollution and ocean dumping are reported. Laws regulating pollution of navigable waters are outlined, including the 1899 River and Harbor Act. One engineering activity of particular concern to the coastal environment is dredging because it modifies the physical hydrology, changes the environment available to organisms and modifies the quality of water to some degree. Refuse discharge permits are also discussed. (See also W73-10098) (Ensign-PAI)
W73-10103

INVOLVEMENT OF NOAA IN COASTAL POLLUTION MANAGEMENT,
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Ecology and Environmental Conservation.
W. Aron.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C., 1972. p 85-103. 8 fig.

Descriptors: *Coasts, Environment, *Ecosystems, *Forecasting, *Environmental control, Fisheries, *Mapping, Charts, Tides, Satellites, Remote sensing, *Management, Water pollution control.

NOAA's role of describing and predicting the environment is reviewed as an essential element in understanding pathological problems in the coastal zone and as a basis for both improving such problems, and providing understanding for environmental improvement in this area. The responsibilities and capabilities within NOAA are described including knowledge of coastal fisheries, mapping, charting, tidal and current predictions and ability to employ the techniques of satellite sensing to develop the knowledge required for management of the coastal regions. The belief that the problems of the coastal zone cannot be treated separately but must be examined as a total ecosystem is emphasized. (See also W73-10098) (Ensign-PAI)
W73-10104

TRENDS IN MARINE WASTE DISPOSAL, GOOD AND BAD,
Engineering-Science, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 05E.
W73-10105

ESTUARINE SURVEYS IN THE SOUTHEAST,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 05B.
W73-10106

OCEANOGRAPHIC SURVEYS FOR DESIGN OF POLLUTION CONTROL FACILITIES,
Engineering-Science, Inc., Berkeley, Calif.
For primary bibliographic entry see Field 05E.
W73-10107

APPLICATIONS OF ESTUARINE WATER QUALITY MODELS,
Manhattan Coll., Bronx, N.Y.
For primary bibliographic entry see Field 05B.
W73-10108

SUBMERGED DIFFUSERS IN SHALLOW COASTAL WATERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
D. R. F. Harleman.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C. 1972. p 227-247. 10 fig, 14 ref.

Descriptors: *Coasts, *Shallow water, *Diffusion, *Waste disposal, *Thermal pollution, Nuclear powerplants, Fossil fuels, Mixing, Momentum transfer, Flow, Nozzles, Theoretical analysis, Equipment, Water pollution effects.
Identifiers: Diffusers (Submerged).

Experimental and analytical results have been presented for submerged multi-port diffusers in shallow waters, typical of coastal waters on the East Coast and in the Great Lakes. The motivation for the research came from the need to find effective ways of disposing of degradable wastes and waste heat from fossil and nuclear power generation. A one-dimensional theory, similar to the momentum theory for propellers, was developed and compared with laboratory experiments. The separate effects of mixing induced by the momentum input of the diffuser and mixing induced by an ambient cross flow in the receiving waters are shown. The nozzles may be pointed in the direction of the cross current, in opposition, or in alternating directions. (See also W73-10098) (Ensign-PAI)
W73-10109

EFFECT OF POLLUTION ON THE MARINE ENVIRONMENT, A CASE STUDY,
Florida State Univ., Tallahassee. Marine Lab.
For primary bibliographic entry see Field 05C.
W73-10110

COASTAL ZONE POLLUTION MANAGEMENT. A SUMMARY,
Clemson Univ., S.C. Dept. of Civil Engineering.
B. L. Edge.
In: Coastal Zone Pollution Management, Proceedings of the Symposium, Charleston, South Carolina, February 21-22, 1972, Clemson University, Clemson, S.C., 1972, p 265-278. 2 fig, 1 tab.

Descriptors: *Coasts, *Water pollution control, *Management, *Surveys, *Environmental effects, *Outlets, Sites, Waste disposal, Industrial wastes, Chemical wastes, Sewage, Solid wastes, Incineration, Dredging, Recycling.

Some of the more basic research efforts that must be undertaken for effective marine pollution control are: conduct baseline surveys (monitor physical, chemical and biological parameters) of waste disposal sites, to find out what damage has been done; study the impact of both treated and untreated effluents on estuarine and ocean waters; select the offshore sites most suitable for disposal of compatible wastes and study the best ways to place them; study the rate at which sewage sludge can be safely assimilated on the continental shelf; and establish quantitative receiving-water values, values that reflect the relative biological value of inland, estuarine, coastal and deep ocean waters. These will allow engineers to select the best locations for outfalls and dumping sites. Waste disposal should be considered as a total system, including ocean dumping, incineration, land disposal, and, most important, recycling. (See also W73-10098) (Ensign-PAI)
W73-10111

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. I. DETERMINING SOME CHOICES, (CHOIX DE PRODUITS POUR LUTTER CONTRE LA POLLUTION DU MILIEU MARIN PAR LES HYDROCARBURES. I. MOTIF DU CHOIX),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
F. Soudan.
Revue des Travaux de l'Institut des Peches Maritimes, Vol 36, No 1, p 81-83, March 1972.

Descriptors: Water pollution control, *Organic compounds, *Cleaning, *Emulsifiers, *Solvents, *Detergents, Chemicals, Toxicity, Efficiencies, *Pollution abatement.

A variety of products to combat marine pollution by hydrocarbons is discussed. A test of these various products determined their efficacy and innocuousness. A product that might be noxious, but that could be employed in weak doses due to its efficiency, was preferred to a relatively mild product employed in large quantities. Emulsifiers with a weak density were preferred for reducing surface tension, and solvents with low boiling points can emulsify viscous petroleum. Relative solubility in seawater was not related to efficacy. Anionic detergents and ethers of polyglycol or perchlorethylene should be avoided because of their toxicity. (See W73-10114 thru W73-10116) (Ensign-PAI)
W73-10113

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. II. EFFICACY OF ANTIPETROLEUM PRODUCTS, (CHOIX DE PRODUITS POUR LUTTER CENTRE LA POLLUTION DU MILIEU MARIN LES HYDROCARBURES. II. EFFICACITE DES PRODUITS ANTIPETROLE),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
P. Michel.
Revue des Travaux de l'Institut des Peches Maritimes, Vol 36, No 1, p 85-102, March 1972. 12 fig, 3 tab, 11 ref.

Descriptors: *Oil pollution, *Cleaning, Efficiencies, *Stability, *Emulsifiers, Toxicity, Environmental effects, *Pollution abatement, Water pollution control.
Identifiers: *Agglomerants, Precipitants.

One hundred and one antipetroleum products were studied to select the most effective. According to their method of action against hydrocarbons, three categories were established: Emulsifiers (liquids), agglomerants (powder), and precipitants (powder). The products were tested on petroleum of three different origins. The emulsifying power, stability, cleaning power, and efficacy coefficient were determined. There is no universal antipetroleum product; emulsifiers are the easiest to apply in all conditions at sea and on beaches, but their toxicity makes them unsuitable where flora and fauna must be protected. Few products are effcient in all cases, especially on viscous petroleum. (See also W73-10113) (Ensign-PAI)
W73-10114

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. III. THE RELATIVE TOXICITY OF ANTIPETROLEUM PRODUCTS ON TWO MARINE ORGANISMS, (CHOIX DE PRODUITS POUR LUTTER CONTRE LA POLLUTION DU MILIEU MARIN PAR LES HYDROCARBURES. III. TOXICITE RELATIVE DE PRODUITS ANTIPETROLE SUR DEUX ORGANISMES MARINS),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
For primary bibliographic entry see Field 05C.
W73-10115

CHOICE OF PRODUCTS FOR CONTROL AGAINST POLLUTION OF THE MARINE ENVIRONMENT BY HYDROCARBONS. IV. THE RELATIVE TOXICITY OF SEVEN ANTIPETROLEUM EMULSION PRODUCTS, (CHOIX DE PRODUITS POUR LUTTER CONTRE LA POLLUTION DU MILIEU MARIN PAR LES HYDROCARBURES. IV. TOXICITE RELATIVE DE SEPT PRODUITS EMULSIONNANTS ANTIPETROLE),
Institut Scientifique et Technique des Peches Maritimes, Nantes (France).
For primary bibliographic entry see Field 05C.
W73-10116

COAST GUARD ANTI-POLLUTION ENGINEERING,
Coast Guard, Washington, D.C.
R. D. Parkhurst.
The Military Engineer, Vol 64, No 421, p 309-311, September-October, 1972. 3 fig.

Descriptors: *Ships, *Design, *Waste treatment, Water pollution control, *Pollution abatement.

Pollution prevention and control operations conducted by the U. S. Coast Guard on its own vessels are reviewed. Pending the completion of an effective shipboard waste treatment system, a method for retaining waste on board for eventual disposal on shore has been adopted. The complex problems surrounding the disposal of bulge and ballast wastes are discussed. At present, no suitable device has been found to effectively and economically treat these wastes. The Air Delivered Anti-Pollution Transfer System (ADAPTS), a method for reducing the quantity of oil spilled in tanker accidents, is another project which the Coast Guard has undertaken to reduce the problems of pollution in the marine environment. The design history of ADAPTS is briefly stated. Other related activities by the Coast Guard include investigations into air fallout caused by sandblasting and painting activities at shore bases, testing oil harvesting equipment, and the development of an airborne all-weather sensor system to detect, map, quantify, and classify oil spills. (Ensign-PAI)
W73-10122

THE ECONOMICS OF OIL TRANSPORTATION IN THE ARCTIC,
Toronto Univ. (Ontario). School of Business.
G. D. Quirin, and R. N. Wolff.
In: Canadian - U. S. Maritime Problems, Law of the Sea Workshop, June 15-17, 1971, Toronto, Canada, University of Rhode Island, Kingston, Law of the Sea Institute, p 32-46, 1972, L. M. Alexander and G. R. S. Hawkins, editors. 10 tab, 3 ref.

Descriptors: *Oil, Oil fields, *Oil industry, *Transportation, *Arctic, *Environmental effects, *Costs, Legal aspects.
Identifiers: *Oil transport, *Pollution potentials.

The possible ecological impact of future transportation of oil down to Canada and the U.S. from Arctic areas is discussed. Alternative energy sources to oil are examined, including hydroelectric energy, natural gas and coal. It is concluded that the need for oil will not be significantly reduced for the next 2 to 6 decades. Transporting oil from the Arctic is viewed as less potentially dangerous to the environment than shipping oil across large ocean areas, the other alternative. Factors such as frequency of pollution, severity of pollution, initial cost of crude oil, and transport costs are compared and contrasted between using northern sources or overseas reserves. The various modes of transporting oil from Arctic areas--pipeline, tanker, and airlift system, etc., are each discussed in some detail. Legal issues, and the issue of national security are also investigated. Shipping oil from northern areas will incur overall pollution costs which will be significantly lower than those arising from using alternative sources of supply. (Ensign-PAI)
W73-10129

OIL SPILLS RESEARCH: A NEW SKIMMER.

Ecolibrium, Vol 1, No 2, p 8, Fall, 1972. 2 fig.

Descriptors: *Oceans, *Oil spills, Equipment, Ships, Research and development, Water pollution control, Design, Pollution abatement.
Identifiers: *Oil skimmers, Oil spill containment.

The oil skimming barge developed by Shell Oil Co. is described. Quick and efficient recovery of oil is facilitated by a flexible design which allows the skimmer to conform to waves and currents while diverting oil and water through a system of baffles which reduce turbulence. The ship has a self-supporting 20-foot wide double-boom diverter flexibly attached to a 19-foot long catamaran hull. Three devices are present to help remove oil: light oil can be removed with a floating aluminum pad, for heavier oil another type of pad is available with a funnel design, lastly for heavy debris mixed with oil, a conveyor belt is used in conjunction with the funnel-design pad. Rubber bags which are supported on pontoons can be used to store and transport recovered oil and water. (Ensign-PAI)
W73-10132

OIL SPILLS RESEARCH: A NEW SYSTEM.

Ecolibrium, Vol 1, No 2, p 6-7, Fall, 1972. 2 fig, 1 tab.

Descriptors: Oceans, *Oil spills, Equipment, Oil pollution, *Surface tension, Currents, Water pollution control, Research and development, *Pollution abatement.
Identifiers: *Polyurethane foam, *Oil spill containment.

Shell Oil Co.'s chemical oil treatment, Oil Herder, is discussed. This agent immobilizes spilled oil through the use of polyurethane foam generated right at the site of a spill. Oil Herder reduces the surface tersion of water and when applied to water adjacent to a slick, causes the oil to contract upon itself rather than spread. This kind of containment system can drift with prevailing winds, so currents present no problems. The problems involved in the development of Oil Herder are described. They center around the areas of storage, transportation, distribution and collection of polyurethane foam. Once the foam has been spread over a water surface, the oil sorbents can be collected with mesh nets. Some experimental collecting methods, including optimum net types, are reviewed. Oil Herder can also be used for beach protection; a beach can be treated with this surface active chemical before a moving oil slick arrives so that the oil will aggregate in discrete pools, rather than soaking into the sand. (Ensign-PAI)
W73-10142

MARINE ENVIRONMENTAL TRAINING PROGRAMS OF THE U.S. NAVY,
Naval Oceanographic Office, Washington, D. C.
Z. Mozian.
In: Environmental Science - Challenge to E/E Education in the Seventies. Institute of Environmental Sciences, Tutorial Proceedings, May 1-3, 1972, New York, New York, p 11-13, (1972).

Descriptors: *Education, *Training, *Oceanography, Pollution abatement, *Environmental control, Water pollution control.

Four training programs offered by the U.S. Naval Oceanographic Office in Maryland are discussed. The areas covered in these courses are hydrography, marine environment, oceanography and marine environmental quality. The programs are of various lengths, ranging from 45 to 7 weeks; they are all open to government personnel, private industry, and public and private school systems. Course outlines and objectives are briefly presented. The subjects treated in the marine environment program may have future impact in the area of pollution prevention by making students aware of technological progress and its second-order effects on nature. (Ensign-PAI)
W73-10143

MARINE POLLUTION, CONCENTRATING ON THE EFFECTS OF HYDROCARBONS IN SEA-WATER,
Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 05B.
W73-10144

DISPOSAL OF CHINA CLAY WASTE IN THE ENGLISH CHANNEL,
Marine Biological Association of the United Kingdom, Plymouth (England). Lab.
For primary bibliographic entry see Field 05B.
W73-10145

THE EFFECT OF MARINE FOULING ON CORROSION OF METALS ANTI-CORROSION TECHNIQUES (INFLUENCE DE LA SALISSURE MARINE SUR LA CORROSION DES METAUX ET MOYENS DE PREVENTION),
Electricite de France, (Chatou). Service Etudes et Projets Thermiques et Nucleaires.
For primary bibliographic entry see Field 08G.
W73-10146

STUDY OF VARIOUS POSSIBLE DESIGNS FOR WATER INTAKE AND OUTLET SYSTEMS OF LARGE POWER STATIONS, CONSIDERING HYDRUALIC PLANT OPERATING PROBLEMS AND SITE SUITABILITY (QUELQUES CONSIDERATIONS SUR LE CHOIX DU SYSTEME P RISE-REJET DES GRANDS AMENAGEMENTS THERMIQUES SELON LEUR LOCALISATION),
Laboratoire National d'Hydraulique, Chatou (France).
J-C. Lebreton, and R. Bonnefille.
Houille Blanche, Vol 205, No 2-3, p 199-202, 1972. 8 fig.

Descriptors: Coasts, Estuaries, *Lagoons, *Environmental effects, *Powerplants, Hydraulic systems, *Intakes, *Outlets, *Cooling, *Design, Sites, Sedimentation, Silting, Suspended solids, Thermal pollution, Mixing, Currents.
Identifiers: Artificial islands.

Various designs are possible for water intake and outlet systems of large nuclear power stations. For plants on an estuary site, cooling capacity must be decided as well as the disturbances to estuarine equilibrium likely to result from heated effluents. Mixing characteristics between different density fluids in the estuary must be known. Further problems relate to sediment behavior and cross-currents that can be created by the intake and outlet system. For coastal plants the recycle problem arises. Various solutions were studied for tidal sites and for sites in lagoons. Problems with silting and suspended particles can be avoided by putting the plant on an artificial island. Intake and outlet for port-sited plants are simpler because they may be placed in separate pools or docks not connected to each other. (Ensign-PAI)
W73-10147

SHELL OIL DEVELOPS NEW OIL BARGE FOR QUICK SPILL RECOVERY.

Offshore, Vol 32, No 11, p 106, October, 1972.

Descriptors: *Ships, *Equipment, *Oil spills, *Water pollution control, Research and development, Pollution abatement.
Identifiers: *Oil skimmers.

A new oil skimming device developed by Shell Oil Co. is described. The skimming barge is equipped with a system that allows various barge components to flex with waves and currents. The ship can also collect oil from the water surface with Shell's Oil Herder, a biodegradable chemical which can reduce the size of a floating slick and herd it towards a mechanical diverter. This new skimming barge is capable of recovering oil from water at speeds up to 2.75 feet per second, with 95% efficiency. (Ensign-PAI)
W73-10149

CONDITIONS FOR THE REMOVAL OF CHROMATE FROM COOLING WATER,
Paducah Gaseous Diffusion Plant, Ky.
For primary bibliographic entry see Field 05D.
W73-10207

MARINE RESOURCE DEVELOPMENT, A BLUEPRINT BY CITIZENS FOR THE NORTHEAST PACIFIC.
Washington Univ., Seattle. Div. of Marine Resources.

Pacific Sea Grant Advisory Program, Seattle, Report No PASGAP 4, August 1972. 24 p.

Descriptors: *Pacific Ocean, *Coasts, *Management, *Resources, Fisheries, Recreation, Tourism, *Water pollution control, Ships, Water pollution control, Conservation, Education, Training, Publications.
Identifiers: *Northeast Pacific coast.

Marine resource problems along the coast of the Northeast Pacific Ocean and suggestions for solutions are summarized. Fisheries, shipping, and coastal zone management are considered, along with pollution, recreation, and tourism. Education, training, and public dissemination of information are suggested, and various methods of conserving marine resources are proposed. (Ensign-PAI)
W73-10222

RECOMMENDED TREATMENT OF OILED SEABIRDS.
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology.

Research Unit on the Rehabilitation of Oiled Seabirds, Advisory Committee on Oil Pollution of the Sea, England Report. June 1972. 11 p.

Descriptors: *Oil pollution, Water pollution effects, Birds, *Cleaning, *Detergents, *Treatment facilities, Transportation, Marking techniques, Treatment, Wettability.
Identifiers: *Seabirds.

A method of treating oiled seabirds which allows most birds to be returned to sea a few weeks after capture is described. Essential facilities of a cleaning center are enumerated along with methods of capture, preliminary treatment, and transportation to cleaning centers. Oiled seabirds should not be washed immediately after capture. The first priority is to keep birds warm, quiet, and well fed. Cleaning involves washing birds with a warm solution (detergent). Birds should be thoroughly rinsed with hot water and then dried. Aftercare procedures are also explained. Birds can be released as soon as they are strong and healthy and have completely water-repellent plumage. Records should be kept on each bird. (Ensign-PAI)
W73-10227

CURRENT STATUS OF RESEARCH ON THE BIOLOGICAL EFFECTS OF PESTICIDES IN CHESAPEAKE BAY,
Westinghouse Ocean Research Lab., Annapolis, Md.
For primary bibliographic entry see Field 05C.
W73-10231

THE PROTECTED OCEAN, HOW TO KEEP THE SEAS ALIVE,
W. Marx.
Coward, McCann, and Geoghegan, Inc., New York. 1972. 95 p, 19 ref.

Descriptors: *Oceans, Oceanography, Chemistry, Biology, *Water pollution sources, *Waste disposal, Fisheries, Construction, Oil pollution, Harbors, Coasts, Protection, Technology, Legislation, *Legal aspects, Water pollution control.

Physical, chemical, and biological characteristics of the oceans are reviewed. Activities of man that are destroying the oceans, such as waste disposal, coastal development, barbor building, fish harvesting, and oil pollution, are described. Legal and technical methods for protecting the oceans from further degradation and for restoring them to a healthy state are summarized. (Ensign-PAI)
W73-10243

UPPER POTOMAC ESTUARY EUTROPHICATION CONTROL REQUIREMENTS,
Environmental Protection Agency, Washington, D.C. Office of Research and Monitoring.
For primary bibliographic entry see Field 05C.
W73-10247

DEEPWATER OFFSHORE PETROLEUM TERMINALS,
Esso Research and Engineering Co., Florham Park, N.J.
J. Mascenik.
Paper presented at American Society of Civil Engineers National Transportation Meeting, July 17-21, 1972, Milwaukee, Wisconsin. Meeting preprint 1748, 27 p, 1972. 8 fig, 5 ref.

Descriptors: *Oil, *Offshore platforms, *Design, Operations, *Buoys, Island, *Water pollution control, Sites, Accidents.
Identifiers: *Mooring.

Requirements for a reliable offshore oil facility are discussed, and design considerations, berth operations, and environmental limitations of sea islands, multi-buoy moorings, and single point moorings are described. Offshore petroleum terminals located away from congested ship channels and ports will minimize pollution from collisions and groundings. Single point mooring is most suitable for installation in unprotected waters and is reliable in severe operating environments. Multi-use of offshore terminals should be avoided. Industry's role in preventing pollution is reviewed. (Ensign-PAI)
W73-10248

RISK ANALYSIS OF THE OIL TRANSPORTAION SYSTEM.
For primary bibliographic entry see Field 05B.
W73-10251

SECOND ANNUAL REPORT OF THE ADVISORY COMMITTEE ON OIL POLLUTION OF THE SEA. RESEARCH UNIT ON THE REHABILITATION OF OILED SEABIRDS.
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology.

1971. 38 P, 9 TAB, 7 REF.

Descriptors: *Oil pollution, *Birds, *Cleaning, *Wettability, *Detergents, Water pollution effects, Mortality.
Identifiers: *Plumage-cleaning materials, *Water-repellency, *Seabirds.

Characteristics of the naturally waterproof plumage of aquatic birds were investigated to devise cleaning methods that would avoid destroying this waterproof property. Laboratory tests showed that minute traces of oil or the cleaning agent on feathers left them wettable. Residual traces of detergent are particularly hard to remove and seemed likely cleaned birds. A considerable range of cleaning agents and detergents were tested. Most were unsuitable for cleaning the oiled plumage but a number of useful preparations were

identified. Desirable properties of any plumage-cleaning material can be specified. Results of autopsies performed on various birds that died after contamination by oil or cleaners are given. (Ensign-PAI)
W73-10255

REGULATION OF ACTIVITIES AFFECTING BAYS AND ESTUARIES: A PRELIMINARY LEGAL STUDY.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 06E.
W73-10256

SUMMARY OF SELECTED LEGISLATION RELATING TO THE COASTAL ZONE.
Texas Law Inst. of Coastal and Marine Resources, Houston.
For primary bibliographic entry see Field 06E.
W73-10257

STORAGE FACILITIES (FOR HAZARDOUS SUBSTANCES) REGULATION PRESENTED AT HEARING ON MARCH 21, 1973.
Missouri Clean Water Commission, Jefferson City.

March 21, 1972. 1 p.

Descriptors: *Storage requirements, *Safety, *Water pollution control, *Missouri, Legal aspects, Water management (Applied), Water quality control, Water pollution sources, Agriculture, Oil, Fertilizers, Pesticides, Herbicides, Public health, Ecology, Administrative agencies, Administrative decisions, Accidents, Hazards, Damages, Regulation.
Identifiers: *Administrative regulations, *Hazardous substances (Pollution), Catchment areas, Entrapment dikes, Spillage.

Any owner or operator of storage facilities for any hazardous materials such as, but not limited to, petroleum products, fertilizers, pesticides, herbicides, cyanide or cyanogen compounds, which are hazardous to health and welfare, or are capable of causing pollution if accidentally released, shall locate and construct such facilities so as to prevent any spillage which might result in pollution of the waters of the state of Missouri, or result in substantial damage to a sewer system or wastewater treatment facility. Such persons shall install any facilities necessary to entrap spillage, such as catchment areas, relief vessels, or entrapment dikes, and take all other measures necessary to prevent accidental pollution of the waters of the state. Site locations, facilities and measures to entrap spillage may be inspected by the agency for compliance with the requirements of this regulation and any other requirements of the Missouri Clean Water Law and regulations, orders, and permits thereunder. (Mockler-Florida)
W73-10258

(EMERGENCY) ENFORCEMENT REGULATION (TO PROTECT STATE WATERS) PRESENTED AT HEARING ON MARCH 21, 1973.
Missouri Clean Water Commission, Jefferson City.

March 21, 1973. 1 p.

Descriptors: *Missouri, *Legal aspects, *Water pollution control, *Water quality control, *Remedies, Law enforcement, Public rights, Local governments, Administration, Water law, Water quality standards, Water pollution control, Water management (Applied), Administrative agencies, Administrative decisions, Regulation, Environmental effects.
Identifiers: *Administrative regulations, *Emergency action (Pollution).

Upon telephonic approval of any four members of the Clean Water Commission, the Executive Secretary may immediately requiest the Attorney General, any prosecuting attorney, or any other counsel, to bring any legal action authorized in the Missouri Clean Water Law. Notwithstanding the foregoing, where in the opinion of the Executive Secretary, immediate action must be taken to protect the waters of the state and he is unable to contact the necessary members of the Commission, or if time prevents such contacts, he may immediately request the Attorney General, any prosecuting attorney or any other counsel to bring an action for injunctive relief to protect the waters of the state or prohibit any violation of the Missouri Clean Water Law. The definitions as set forth in the Missouri Clean Water Law and Commission Definitions Regulation shall apply to those terms when used in this regulation, unless the context clearly requires otherwise. (Mockler-Florida)
W73-10259

MISSOURI WATER POLLUTION CONTROL BOARD REGULATIONS FOR TURBID WATER DISCHARGES, (TO PREVENT INTERMITTENT OR ACCIDENTAL POLLUTION OF WATERS OF THE STATE).
Missouri Water Pollution Board, Jefferson City.

January 19, 1967. 2 p.

Descriptors: *Missouri, *Administrative agencies, *Water pollution sources, *Water pollution effects, *Turbidity, State governments, Administrative decisions, Legal aspects, Legislation, Water management (Applied), Water policy, Water resources, Density, Water quality, Public health, Safety, Waste disposal, Regulation.
Identifiers: *Administrative regulations, *Spillage, Jackson Candle Turbidimeter, Missouri Water Pollution Law.

The turbidity of any waste discharge from any washing operation into clean waters of the state shall not exceed 50 turbidity units at the point of discharge, as measured by approved methods outlined in standard methods for the examination of water and waste water, twelfth edition. The resultant turbidity of waste discharge mixed with waters of the receiving stream shall not exceed turbidity stipulated by standards in accordance with the Missouri Water Pollution Law. Storage facilities for materials which are hazardous to health and welfare or capable of casuing pollution shall be located so as to prevent spillage into state waters, sewage collection systems or waste treatment works that might result in pollution or substantial damage. Measures to entrap spillage shall be installed to prevent accidental pollution of state waters. Site locations and measures to entrap spillage may be inspected by the Missouri Water Pollution Board. (Dunham-Florida)
W73-10260

RESERVOIR RELEASE RESEARCH PROJECT.

Sport Fishing Institute Bulletin, No 243, p 1-4, April 1973. 1 fig.

Descriptors: *Oxygen demand, *Reservoir releases, *Reservoir fisheries, *Fish populations, *Aquatic environment, Reservoir construction, Discharge (Water), Fish management, Surface waters, Water management (Applied), Fish management, Impoundments, Water storage, Aquatic life, Fish conservation, Research and development, Sport fish, Ecology.
Identifiers: Hypolimnial discharge, Epilimnial discharge.

A five-year research project dealing with the effect of hypolimnial and epilimnial discharge regimes of reservoirs as they affect dissolved oxygen distribution concludes that reservoir-outlet locations do not appear to affect significantly either sport fish catch or biological productivity. However, hypolimnial discharge made possible substantial additional coldwater fisheries in tailwaters without detriment to existing warmwater fisheries. Researchers recommended, to insure maximum vertical distribution within the reservoir system of biologically significant quantities of dissolved oxygen, that reservoirs be discharged from the deepest possible water strata. Field data were collected from three experimental reservoirs to measure any significant differences in reservoir productivity indices. An outline of the experiment and methods of gathering data are included. (Napolitano-Florida)
W73-10261

DREDGING AND FILLING, COWIKEE STATE PARK, LAKEPOINT RESORT, WALTER F. GEORGE LAKE, CHATTAHOOCHEE RIVER, ALABAMA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W73-10265

CONTROL OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.) IN TVA RESERVOIRS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 04A.
W73-10266

ELIMINATION OF HAZARDOUS OPEN CANALS.
For primary bibliographic entry see Field 06E.
W73-10267

THIRD ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY.
For primary bibliographic entry see Field 06E.
W73-10272

WATER POLLUTION.
For primary bibliographic entry see Field 06E.
W73-10277

REGULATION OF WATER RESOURCES.
For primary bibliographic entry see Field 06E.
W73-10278

CONSERVATION--GENERALLY.
For primary bibliographic entry see Field 06E.
W73-10280

NATURAL AND SCENIC RIVERS SYSTEM.
For primary bibliographic entry see Field 06E.
W73-10282

PROHIBITIONS ON CERTAIN DETERGENTS.
For primary bibliographic entry see Field 06E.
W73-10283

PROSPECTING AND DEVELOPMENT OF PETROLEUM PRODUCTS IN RIVER BEDS, LAKE BEDS, AND SHORELANDS--PREFERENTIAL RIGHTS.
For primary bibliographic entry see Field 06E.
W73-10284

PLUGGING WELLS--DECLARATION OF POLICY, AND ADMINISTRATIVE REGULATION.
For primary bibliographic entry see Field 06E.
W73-10285

AN ACT TO PROVIDE FURTHER FOR WATER POLLUTION CONTROL, ESTABLISHING A NEW WATER IMPROVEMENT COMMISSION AND PRESCRIBING ITS JURISDICTION, POWERS, AND DUTIES.
For primary bibliographic entry see Field 06E.
W73-10287

DISCHARGE OF SEWAGE AND LITTER FROM WATERCRAFT.
For primary bibliographic entry see Field 06E.
W73-10289

SEWAGE COLLECTION, ETC., FACILITIES.
For primary bibliographic entry see Field 06E.
W73-10290

ALABAMA WATER WELL STANDARDS.
For primary bibliographic entry see Field 06E.
W73-10291

ADAM V. GREAT LAKES DREDGE AND DOCK COMPANY (SUIT TO RECOVER DAMAGES FOR DESTRUCTION OF OYSTER BED).
For primary bibliographic entry see Field 06E.
W73-10295

MUNICIPAL WATER AND SEWER AUTHORITY OF CENTER TOWNSHIP, BUTLER COUNTY V. NORTHVUE WATER COMPANY, INC. (ACTION TO DIRECT SEWER AND WATER AUTHORITY TO SUPPLY WATER TO UTILITY COMPANY).
For primary bibliographic entry see Field 06E.
W73-10297

CITY OF TEXARKANA V. TAYLOR (ACTION FOR DAMAGES CAUSED BY SEWAGE BACKUP).
For primary bibliographic entry see Field 06E.
W73-10299

WATER CONSERVATION COMMISSION.
For primary bibliographic entry see Field 06E.
W73-10303

CESSPOOLS, PRIVY WELLS AND DRAINAGE SYSTEMS.
For primary bibliographic entry see Field 06E.
W73-10307

WATERCOURSES; DIVERSION, OBSTRUCTION, OR POLLUTION AS CONSTITUTING TRESPASS.
For primary bibliographic entry see Field 06E.
W73-10308

WATER SUPPLY QUALITY CONTROL.
For primary bibliographic entry see Field 06E.
W73-10309

ATTITUDES ON ENVIRONMENTAL QUALITY IN SIX VERMONT LAKESHORE COMMUNITIES,
Vermont Univ., Burlington.
For primary bibliographic entry see Field 06B.
W73-10310

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS, PART 2.
Council on Environmental Quality, Washington, D.C.
Available from the National Technical Information Service as PB-211 918, $5.45 in paper copy, $0.95 in microfiche. July 27, 1972. 103 p, 5 tab, 30 exhibits.

Descriptors: *Water pollution control, Acidic water, Effluents, Federal Water Pollution Control Act, Pollutant identification, Economic feasibility, *Economic impact, *Pollution abatement, Water pollution sources.
Identifiers: Industry study, *Steel industry.

This volume is Part II of a final report on the potential economic impact on the steel industry of meeting Federal air and water pollution abatement requirements. The volume includes (1) an evaluation of the steel industry's growth patterns, operating practices, and competitive environment; (2) an assessment of the industry's recent financial performance; and (3) a description of the process of manufacturing steel in order to identify significant pollutants generated at each production stage along with abatement techniques to control them. It was found that air pollution is more difficult to control and requires more advanced technology than that required to treat waste water. Relative quantities of water effluent from various operations should be evaluated in light of the percentage of product that is processed by each operation. (Weaver-Wisconsin)
W73-10312

ON TAXATION AND THE CONTROL OF EXTERNALITIES,
Princeton Univ., N.J. Dept. of Economics.
W. J. Baumol.
The American Economic Review, Vol 62, No 3, p 307-322, June 1972. 3 fig, 22 ref.

Descriptors: *Taxes, *Pollution taxes (Charges), Economic efficiency, Water pollution control, Optimization, *Water allveation.
Identifiers: *Pigouvian tax-subsidy programs, *Optimal resource allocation, Externalities, Public goods, Economic theory.

In a critical analysis of the theory of Pigouvian tax-subsidy programs, it is argued that the prescriptions of the Pigouvian tradition are generally those required for an optimal allocation of resources. In addition, where an externality is of the public goods variety, neither compensation to nor taxation of those who are affected by it is compatible with optimal resource allocation. This is an important consideration with respect to the typical pollution problem. Pigouvian taxes (subsidies) upon the generator of the externality are all that is required. The Pigouvian proposals suffer from a number of serious shortcomings as operational criteria when they are implemented precisely as they emerge from theory. Thus, a modified approach is discussed. This approach consists of two steps: (1) the setting of standards for levels of pollution that are considered tolerable, and (2) the design of taxes and effluent charges whose rates are shown by experience to be sufficient to achieve the selected standards of acceptibility. (Weaver-Wisconsin)
W73-10314

SYMPOSIUM ON DIRECT TRACER MEASUREMENT OF THE REAERATION CAPACITY OF STREAMS AND ESTUARIES.
For primary bibliographic entry see Field 05B.
W73-10337

REAERATION CAPACITY OF THE FLINT, SOUTH AND PATUXENT RIVERS,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-10343

REAERATION STUDIES OF THE CHATTAHOOCHEE RIVER,
For primary bibliographic entry see Field 05B.
W73-10345

MODEL STUDY OF REAERATION CAPACITY OF THE JAMES RIVER ESTUARY (VIRGINIA),
For primary bibliographic entry see Field 05B.
W73-10346

FIELD STUDIES IN YAQUINA RIVER ESTUARY OF SURFACE GAS TRANSFER RATES,
For primary bibliographic entry see Field 05B.
W73-10347

RADIOLOGICAL SAFETY,
For primary bibliographic entry see Field 05B.
W73-10348

EFFECT OF HYDRAULIC PROPERTIES ON REAERATION,
For primary bibliographic entry see Field 05B.
W73-10349

POLLUTANT EFFECTS ON REAERATION,
For primary bibliographic entry see Field 05B.
W73-10350

OBSERVED VS. CALCULATED REAERATION CAPACITIES OF SEVERAL STREAMS,
For primary bibliographic entry see Field 05B.
W73-10351

RELATIONSHIPS BETWEEN HYDRAULIC PROPERTIES AND REAERATION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
E. C. Tsivoglou.
In: Proceedings of Symposium on Direct Tracer Measurement of the Reaeration Capacity of Streams and Estuaries; Georgia Institute of Technology, Atlanta, July 7-8, 1970: Environmental Protection Agency Water Pollution Control Research Series 16050 FOR 01/72, p 185-194, January 1972. 2 fig.

Descriptors: *Reaeration, *Hydraulics, *Water measurement, *Channel morphology, Discharge measurement, Flow rates, Gaging stations, Hydrographs, Streamflow, On-site data collections, Hydrologic data.

The basic relationships between the reaeration capacity of a stream and its hydraulic properties were studied with the practical aim of developing the capability to predict reaeration on the basis of field measurement of appropriate hydraulic properties. The rate of reaeration is directly proportional to the rate of water surface replacement. The rate of water surface replacement is proportional to the rate of energy dissipation in open channel flow. Therefore, gas transfer in a turbulent natural stream is dependent only upon the change in water surface elevation. At a given water temperature the amount of tracer gas that will be lost to the atmosphere in a specific length of stream channel, or the amount of DO deficit that will be satisfied, can be predicted on the basis solely of the change in water surface elevation. All of the individual tracer gas loss data obtained from five separate tests in the Patuxent River have been plotted, with the observed percent loss of tracer gas shown as a function of the change in water surface elevation between sampling points. The relationship predicted is clearly demonstrated by the data. (See also W73-10337) (Knapp-USGS)
W73-10352

THE UTILIZATION AND CONSUMPTION OF MERCURY IN FRANCE: OUTLINE OF THE RESULTING HEALTH PROBLEMS, (IN FRENCH),
Laboratoire Central de Recherches Veterinaires, Alfort (France).
For primary bibliographic entry see Field 05B.
W73-10389

HYGIENIC SUBSTANTIATION OF PERMISSIBLE HUMIDITY LEVEL IN CASE OF HIGH TEMPERATURE, (IN RUSSIAN),
Institut Gigieny Truda i Professionalnykh Zabolevanii, Moscow (USSR).
E. F. Medvedeva, and N. A. Fedotova.
Gig Sanit. Vol 36, No 12, p 23-25, 1971. Illus. English summary.
Identifiers: Humans, *Humidity, *Hygienic standards, Regulation, Temperature, *Thermo regulation strain.

The investigations detected the most pronounced strain in human body thermoregulation under conditions of chamber air temperature amounting to 28 deg., that is the maximum permissible level for warm season in accordance with sanitary standards. Under conditions of 40% relative air humidity the changes in physiological reactions correspond to moderate thermoregulation strain; in more humid air (55-65%) there was intense strain. Alterations in sanitary standards are recommended.--Copyright 1972, Biological Abstracts, Inc.
W73-10390

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

PRELIMINARY WATER AND WASTE MANAGEMENT PLAN.
Metcalf and Eddy, Inc., Boston, Mass.

Report to Sacramento Regional Area Planning Commission, Sacramento, California, November 1969. 118 p, 6 fig, 20 tab.

Descriptors: *Planning, *Water supply, *Sewerage, *Drainage, Project planning, Groundwater, Water reuse, Waste water treatment, Financing, Administration.
Identifiers: *Utility extension planning, Consolidation, Wastewater reclamation, Sacramento, California.

Preliminary plans for water supply, sewerage, and drainage facilities for the Sacramento region are presented in this report. The plans are meant to be a guide to what is feasible and logical in terms of water resource projects and are framed in both long-range plans and short-range projects. Since financing is an important consideration the recommended short-range projects are those of highest priority and are intended to alleviate existing problems or deficiencies. The report emphasizes a planning approach that includes planning objectives, identification of problems, evaluation of system adequacy, and programs to be implemented by local agencies under regional review. The main sections of the report are land use and population, water systems, sewerage systems, and drainage. Estimated costs for remedial and short range projects are given. Some of the recommendations include the need for more data on groundwater, an emphasis on using reclaimed wastewater especially for agriculture and groundwater recharge, consolidation of facilities to eliminate a number of small treatment plants, and consideration of advanced wastewater treatment facilities or transport of treated effluent. (Elfers-North Carolina)
W73-09813

COMPREHENSIVE AREA-WIDE WATER AND SEWER PLAN.
Robert and Co. Associates, Atlanta, Ga.

Prepared for the Middle Georgia Planning Commission, Macon. Phase I, July 1969. 79 p, 1 photo, 4 maps, 3 tab, 1 append. HUD UPA Ga. P-61.

Descriptors: *Planning, Water supply, Sewers, Project planning, Financing, Coordination.
Identifiers: *Utility extension planning, *Inventory, Macon, Georgia, Zoning controls, Rural water systems, Middle Georgia Area.

The existing systems around Macon, Georgia were analyzed. The seven-county area is described in terms of land use, population, transportation, geology, drainage basins, and water quantity and quality. Existing water and sewer systems are described and projected improvements discussed. Means of financing the improvements and related zoning and subdivision regulations are presented. The basic recommendations include the need for a 5-10 year improvement program, a program for area-wide coordination and continued planning, a storm drainage and flood control plan, and a number of specific feasibility studies for expansion projects. (Elfers-North Carolina)
W73-09814

LAKEFRONT NEW ORLEANS, PLANNING AND DEVELOPMENT, 1926-1971,
Louisiana State Univ., New Orleans. Urban Studies Inst.
J. A. Filipich, and L. Taylor.
53 P, 36 FIGS, 10 REF. 1971.

Descriptors: *Planning, Land use, Levee, Long-range planning, Financing, Design, Land reclamation.
Identifiers: *Lakefront development, New Orleans (Louisiana), Lake Pontchartrain, Master plan.

The land reclamation and lakefront development that has occurred on Lake Pontchartrain since 1926 and some insights for future development are presented as described. The New Orleans Lakefront experience can provide useful information and guidelines for other urban areas. Much of the report traces the history of the lakefront development including levee construction, financing, parks, several subdivisions, the lakefront airport, recent expansions, and new design concepts. The importance of long-range planning is stressed. Several key factors for successful implementation are: (1) the formulation of a master plan with compatible land uses; (2) the creation of an operating agency to supervise the development according to the master plan; (3) the provision of a strong financial and jurisdictional base for the operating agency; (4) use of feedback information to provide flexibility in the overall program; (5) strong control over the development to prevent speculative intrusions from private developers. (Elfers-North Carolina)
W73-09822

PLANNING FOR ENVIRONMENTAL QUALITY, PHASE I,
North Carolina State Dept. of Administration, Raleigh. State Planning Div.
R. A. Paul.
Available from the National Technical Information Service as PB-213 147, $7.25 in paper copy, $0.95 in microfiche. Prepared in cooperation with the Interagency Task Force on Environment and Land Use Planning. Report No. NCP-146.09. June 1972. 81 p, 8 fig, 2 append. HUD NCP-146. CPA-NC-04-00-0146.

Descriptors: *Environmental effects, Water quality, Land use, Natural resources, Waste water disposal, North Carolina.
Identifiers: *Environmental planning, *Environmental indicators.

This report is the first of a planned series of documents with the purpose of articulating the concern of the State of North Carolina for preserving its environmental quality. The series is intended to cover such areas as environmental quality goals, policies, legislation and research activities and to communicate this information to state agencies and the public. This first report reviews the environmental planning process in North Carolina and discusses the concept and use of environmental indicators. The two key planning bodies are the N.C. Council on State Goals and Policy and the Interagency Task Force on Environmental and Land Use Planning. Some of the environmental indicators discussed relate to air quality, water quality, wildlife abundance, housing quality, recreational areas, and natural resources. The environmental indicators are also related to broader areas of environmental quality such as energy and land use policies. Water supply, wastewater disposal, and solid waste disposal systems are also used as environmental indicators. (Elfers-North Carolina)
W73-09824

METROPOLITAN COMPREHENSIVE WATER, SEWAGE, AND SOLID WASTE PLANNING STUDY.
Bi-State Metropolitan Planning Commission, Rock Island, Ill.

Summary. March 31, 1970. 30 p, Illus, 5 map, 4 fig.

Descriptors: *Planning, Water supply, Sewerage, Drainage systems, Solid wastes, Pollution abatement, Project planning, Water management, Iowa, Illinois.
Identifiers: *Utility extension planning, Davenport (Iowa), Rock Island (Ill), Moline (Ill), Scott County (Iowa), Rock Island County (Ill).

This summary of a three volume report on the planning and development of water supply, sanitary sewer, storm water drainage, and solid waste disposal systems in the two county area which includes the cities of Rock Island, Moline, and Davenport, is oriented to a quick and interesting presentation of the principal concepts and plan elements of the main report. It is divided into the following basic section: (1) an introduction including a discussion of pollution problems; (2) a listing of goals and objectives plus an outline of the planning process; (3) the basic plan concepts and elements of the water supply, sewerage, solid waste disposal, and storm drainage system for the central urbanized area; (4) and similar concepts and plans for the outlying communities in the region. The planning summary is to be used as a public information document, but not as a source of detailed information on the actual plans. (Elfers-North Carolina)
W73-09829

A MARGINAL ANALYSIS - SYSTEM SIMULATION TECHNIQUE TO FORMULATE IMPROVED WATER RESOURCES CONFIGURATIONS TO MEET MULTIPLE OBJECTIVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
E. A. McBean, and J. C. Schaake, Jr.
Doctoral thesis, Report No. 166, Ralph M. Parsons Laboratory for Water Resources and Hydrodynamics, Department of Civil Engineering, MIT, Cambridge, Mass., February 1973. 366 p, 114 fig, 29 tab, 178 sym, 138 ref, 5 appen.

Descriptors: *Simulation analysis, Water resources development, *Planning, *Reservoirs, *Multiple-purpose projects, *Markov processes, Analytical techniques, *Optimization, Estimating, River basins, Streamflow, Reservoir releases, Reservoir storage, Optimum development plans, Benefits, Equations, Water supply, Design, Systems analysis, *Mathematical models, Computer models.

Identifiers: *Marginal analysis, Search techniques, Gradient vectors, Response surface, Multiple-objective environment, Marginal value estimates.

Several procedures are developed to compute estimates of the gradient vector of a response surface for a water resources planning problem by using the information obtained from only a single run of a simulation model. This gradient information is combined with a search procedure, significantly increasing the efficiency of search for the optimal water resources plan configuration. The bases for the marginal analysis estimators are developed from a probabilistic Markov model of the reservoir state transitions from one time period to another. The marginal analysis capabilities arise by recognizing how the reservoir transitions would be changed by modification of decision variables. The estimators are applicable to complex basin planning problems by allowing segmentation of complex systems into separate segments, the connectivity being provided by information transfers between appropriate segments. All of the information necessary to the estimators can be collected during the normal execution of a simulation model with only minor increases in computer storage and execution time. The properties and behavior of the gradient vector estimators are examined under varying considerations such as flow conditions, execution lengths, and extent of aggregation in state levels. Several areas in need of further work are identified. (Bell-Cornell)
W73-09832

COMPUTER LANGUAGES FOR ENGINEERS,
New Mexico State Univ., University Park. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05G.
W73-09834

OPTIMAL CONTROL OF MULTI-UNIT INTER--BASIN WATER-RESOURCE SYSTEMS,
North Carolina Univ., Chapel Hill. Dept. of City and Regional Planning.
For primary bibliographic entry see Field 04A.
W73-09835

ESTIMATION THEORY APPLICATIONS TO DESIGN OF WATER QUALITY MONITORING SYSTEMS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-09837

SEARCH TECHNIQUE FOR PROJECT SEQUENCING,
British Columbia Hydro and Power Authority, Vancouver.
C. A. Tsou, L. G. Mitten, and S. O. Russell.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY 5, Proceedings paper No 9732, p 833-839, May 1973. 1 fig, 6 equ, 8 ref.

Descriptors: Water resources development, Hydraulics, *Projects, *Scheduling, *Longterm planning, *Optimization, Management, Costs, Alternative planning, Decision making, Demand, Evaluation, Equations, Optimum development plans.
Identifiers: *Project sequencing, *Sensitivity testing, Screening, Minimum discounted cost, Search procedures.

A new, short-cut technique is presented for finding the optimal sequence of projects that will meet a projected growing demand at minimum or near minimum discounted cost, given estimated costs and outputs for the candidate projects. The method can be applied in the preliminary screening phase of a large complex study. Examples are the development of the hydroelectric potential of a river basin or the supply of water to a growing city. A sensitivity testing procedure is given for computing the amount by which the cost of any project would have to change to enable it to occupy any position in the optimal sequence. This procedure forms the base for an efficient planning strategy for the case in which the engineer is particularly interested in correctly selecting the next few projects, but being sure that they are compatible with the overall scheme of development. It is simple to use and it provides results in a form that can be readily assimilated, an important consideration in complex planning problems dealing with many intangibles. (Bell-Cornell)
W73-09838

THE DISSIPATION OF EXCESS HEAT FROM WATER SYSTEMS,
Geological Survey, Bay St. Louis, Miss.
For primary bibliographic entry see Field 05B.
W73-09839

THERMAL CAPACITY OF OUR NATION'S WATERWAYS,
Westinghouse Hanford Co., Richland, Wash.
For primary bibliographic entry see Field 05G.
W73-09840

AN APPROACH TO ANALYSIS OF ARCH DAMS IN WIDE VALLEYS,
Southampton Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08A.
W73-09841

OPTIMIZATION OF CIRCULATING WATER SYSTEM,
Worcester Polytechnic Inst., Mass.
For primary bibliographic entry see Field 05G.
W73-09842

SYSTEMS APPROACH TO POWER PLANNING,
Bechtel Corp., San Francisco, Calif. Hydro and Community Facilities Div.
J. G. Thon.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 99, No HY4, p 589-598, April 1973. 4 fig, 12 ref.

Descriptors: Computers, *Transmission (Electrical), *Electrical networks, *Planning, *Coordination, Electric power production, Thermal power plants, Hydroelectric power, Pumped storage, *Systems analysis, Dynamic programming, Design, Management, Estimating, Power system operation, Comprehensive planning.

A broad discussion of systems planning for the electric power industry is presented. The main geographic area which is considered is the Western Region of the United States. This region had the first power pooling agreements in the 1940's and is likely to see a large amount of growth in the future. Today interconnection has been accomplished for nearly all systems in the U.S. and Canada. The feasibility of bulk power transmission over long distances and the projected increases and accompanying energy requirement increases have made coordination of planning unavoidable. Weekly load curves and daily peak requirements on large power pools must be met economically and efficiently. Combinations of base load thermal plants, less efficient oil-fired plants and fast response hydroelectric facilities are necessary. Stronger connections with adjacent areas represent another alternative. A great many factors, such as new energy sources and technology, pollution controls, engineering obstacles, generation interconnection, fuel location, plant siting and others must be considered in any short or long range planning. Planning models are discussed briefly. (Jerome-Vanderbilt)
W73-09859

CONTROL OF THE OPERATING REGIMES OF WATER RESOURCES SYSTEMS,
For primary bibliographic entry see Field 04A.
W73-09868

AN INVESTIGATION INTO THE LONGTERM PERSISTENCE OF U. S. HYDROLOGIC RECORDS,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 04A.
W73-09869

HOW FREQUENTLY WILL FLOODS OCCUR,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W73-09992

HYDRO-POWER SYSTEM SIMULATION TECHNIQUE,
Corps of Engineers, Portland, Oreg. North Pacific Div.
For primary bibliographic entry see Field 04A.
W73-10019

THE ENVIRONMENTAL MATRIX: INPUT-OUTPUT TECHNIQUES APPLIED TO POLLUTION PROBLEMS IN ONTARIO,
Department of Energy, Mines and Resources, Burlington (Ontario). Canada Center for Inland Waters.
For primary bibliographic entry see Field 05G.
W73-10020

TIME PERIODS AND PARAMETERS IN MATHEMATICAL PROGRAMMING FOR RIVER BASINS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 04A.
W73-10317

6B. Evaluation Process

THE TEXAS WATER PLAN AND ITS INSTITUTIONAL PROBLEMS,
Texas A and M Univ., College Station. Water Resources Inst.
C. W. Jensen, and W. L. Trock.
Available from the National Technical Information Service as PB-220 683, $3.00 in paper copy $0.95 in microfiche. Technical Report 37, January 1973, 73 p, 64 ref. OWRR B-025-TEX (10). 14-01-0001-1558.

Descriptors: *Institutions, *Water rights, Costs benefit analysis, *Cost sharing, Financing, Operating costs, Jurisdiction, Indirect costs, Texas, Water districts, Water supply, Water allocation, Planning, Decision making, *Imported water.
Identifiers: *Texas Water Plan, Master water districts.

An expansion of the supply of water greater efficiency in its use are necessary for the future economic development of the state of Texas. Imported water, supplemental to that available in the state, is an important part of development plans as outlined in the Texas Water Development Board. Implementing the Board's plan to reallocate water supplies and improve the efficiency of land and water use will raise many serious problems. Solutions will be required in a wide array of institu-

tional problems that will extend to such areas as the interstate diversion and interbasin transfers of water, doctrines or water rights and legislated water use-priorities, acreage restrictions established in federal reclamation law, comingling public and private water, construction financing, revenue production through a system of taxation and water sales, and the organizing of new institutions for governing the entire system. As the need for master or other special districts is faced, decisions will be required as to whether to organize for centralized control from the state level or with emphasis on control by the local area. Reorganizing institutions, or their formalized cooperation, will be necessary to permit local control, yet be able to induce the desired efficiency in resource use that will make the Texas Water System succeed. Failure to achieve efficiency in the functioning of institutions may result in an institutional overhead so high as to prohibit realization of the anticipated System benefits. (Runkles-Texas A andM)
W73-09756

PROJECTIONS OF WATER USE AND CONSERVATION IN THE USSR, 2000 (ORIYENTIROVOCHNYY PROGNOZ ISPOL'ZOVANIYA I OKHRANY VODNYKH RESURSOV SSSR NA UROVNE 2000 G.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
M. I. L'vovich, and N. I. Koronkevich.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 2, p 35-47, March-April 1971. 5 tab, 40 ref.

Descriptors: *Projections, *Water utilization, *Alternative water use, *Water conservation, *Water resources development, Water supply, Water demand, Water users, Consumptive use, Waste water (Pollution), Waste water disposal, Waste water treatment, Water pollution control, Hydrologic budget.
Identifiers: *USSR.

Several alternatives are considered in developing a plan for utilization and conservation of water resources in the USSR for the year 2000. Two alternatives call for disposal of waste water in rivers, based either on present pollution control techniques or on improvements in water utilization and waste-water treatment. A third alternative, based on water utilization and conservation principles developed by the Institute of Geography of the USSR Academy of Sciences, calls for nationwide stoppage of waste-water disposal in rivers, and a fourth alternative, for limited stoppage affecting only the most heavily populated regions of the country. The fourth alternative will solve the water problem as successfully as the third at a one-third reduction in capital costs. (Josefson-USGS)
W73-09804

WATER AND WASTEWATER FOR BROWARD COUNTY, FLORIDA.
Benham-Blair and Affiliates of Florida, Inc. Fort Lauderdale.

Prepared for Broward County Planning Board, Fort Lauderdale, Florida, February 1970. 256 p, 37 fig, 25 tab, 7 append.

Descriptors: *Wastewater disposal, *Planning, *Administration, *Water supply, Sewerage, Groundwater, Pollution abatement, Project planning, Water management, Financing, Florida.
Identifiers: *Utility extension planning, Broward County (Florida), Fort Lauderdale (Florida).

Water supply and wastewater disposal are discussed for the eastern part of Broward County, which includes Fort Lauderdale. Because of the great growth in this area, there is an urgent need to plan for the optimum use of the groundwater resources, to begin a concerted effort to control water pollution, and to centralize the administration of the county's water resources. Detailed information is presented on land use and water demands, geology and groundwater, water pollution and water quality criteria, and financial and organizational data. The basic recommendations are that water be supplied to the whole planning area via 3 districts using optimally located wells to prevent salt water intrusion and that a single county-wide sewerage agency collect wastewater and dispose it out in the Atlantic Ocean after primary treatment and chlorination at 2 central treatment plants. These recommendations are largely based upon least-cost financial considerations and an objective of administrative efficiency. (Elfers-North Carolina)
W73-09816

HUD SEWER POLICY IN URBAN RENEWAL AREAS,
Paterson Redevelopment Agency, N.J.
For primary bibliographic entry see Field 06E.
W73-09820

PROGRAM DESIGN FOR PLANNING WATER QUALITY MANAGEMENT IN KENTUCKY RIVER BASINS.
Schimpeler-Corradino Associates, Louisville, Ky.; and Schimpeler-Corradina Associates, Lexington, Ky.

Available from the National Technical Information Service as PB-212 957, $12.25 in paper copy, $0.95 in microfiche. Prepared for Kentucky Development Office and Kentucky Department of Health, Division of Water Pollution Control, June 1972. 138 p, 11 fig, photos, 20 tab, 9 append. HUD - CPA-KY-04-00-0088.

Descriptors: *Water quality control, Water quality standards, River basins, Environmental effects, Coordination, Financing, Kentucky, Water pollution sources, Management.
Identifiers: *Water quality management.

This study was to interpret the Environmental Protection Agency's guidelines for water quality management and to design a program for the formulation of water quality management plans for the ten major river basins in Kentucky. The EPA guidelines, issued in 1971, set certain policies and procedures for water quality planning and management and the formulation of the plans is necessary to qualify for federal wastewater treatment facility grants. Part I is a step-by-step procedure for preparing basin water quality management plans and covers basin characteristics, pollution sources, water resources, planning alternatives, and a discussion of management strategies. Part II covers the implementation of the water quality plans and strategies in Kentucky river basins and includes descriptions of the ten river basins, priorities for the planning efforts, costs of formulating the plans, the institutional aspects involved, and the means of financing the management programs. The report also covers water quality standards, information systems, and environmental assessment. (Elfers-North Carolina)
W73-09825

REGIONAL BENEFITS IN FEDERAL PROJECT EVALUATIONS,
Michigan Univ., Ann Arbor. School of Natural Resources.
G. Schramm.
The Annals of Regional Science, Vol VI, No 1, p 84-95, June 1972. 1 fig, 15 ref.

Descriptors: Water resources, *Federal government, Projects, *Income, Regions, *U.S. Water Resources Council, *Benefits, Costs, Feasibility, *Regional analysis, Regional development, Evaluation, Project benefits.
Identifiers: Project selection, Regional benefits.

Investigated is to what extent, if any, regional income considerations should affect the selection, evaluation and scope of federal water resources projects. While this analysis is limited to the U.S. Federal Water Resource Sector (a leader in the area of the analysis of the benefits and costs of public investment activities), the findings should be readily applicable to other federal expenditure categories. The paper considers, if appropriate for a federal agency to consider regional as well as federal income objectives, should it be permitted to trade off favorable regional against net national income gains. And if so, is the presently existing national efficiency requirement of benefits/cost still a useful guide to project selection. Discussed is the U.S. Water Resources Council's proposal to set up a four-account system to evaluate projects in terms of: (1) national income benefits and costs; (2) environmental quality; (3) social well-being; and (4) regional development objectives. These four groups of objectives which, in almost all cases, would contain mutually exclusive elements would replace the existing single objective--national income maximization. Conclusions sympathetic to the proposal are presented; however, significant doubts are raised as to the efficacy of the proposed evaluation procedures, and alternative approaches are suggested. (Bell-Cornell)
W73-09830

INVESTMENT PLANNING FOR IRRIGATION DEVELOPMENT PROJECTS,
Boston Univ., Mass.
For primary bibliographic entry see Field 03F.
W73-09831

A MARGINAL ANALYSIS - SYSTEM SIMULATION TECHNIQUE TO FORMULATE IMPROVED WATER RESOURCES CONFIGURATIONS TO MEET MULTIPLE OBJECTIVES,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 06A.
W73-09832

FEASIBILITY STUDIES IN WATER RESOURCE PLANNING,
Wyoming Univ., Laramie.
T. L. Dobbs.
Agricultural Experiment Station, Laramie, Bulletin B-579, September, 1972. 16 p, 1 fig, 1 tab, 6 ref. OWRR A-002 WYO (5).

Descriptors: *Water resources development, *Planning, *Feasibility studies, Economic efficiency, Cost-benefit analysis, Environmental effects, Social aspects, Financial feasibility.
Identifiers: *Environmental quality.

The considerations that should enter into feasibility studies of water resource development projects at the state level are discussed in non-technical terms understandable to the lay public. Feasibility studies have four components: analyses of (1) economic efficiency, (2) environmental quality, (3) social factors, and (4) financial feasibility. The economic efficiency portion of a project evaluation deals with benefits and costs that are measurable in dollar terms. Benefits and costs are stated in terms of discounted present values. Two decision rules are available for ranking alternative projects, (1) net present value of benefits, and (2) the ratio of discounted benefits to discounted costs. Illustrations of these decision rules and discounting techniques are provided. Goods and services of an environmental nature frequently fall into a 'non-market valued' category, and consequently should be evaluated on the basis of an environmental quality objective. Social factors include an assortment of project effects not included in efficiency or environmental quality evaluations. Examples include income effects on poverty or minority groups and increased security provided by flood protection. Fianancial feasibility evaluations focus on project financing and repayment. (Settle-Wisconsin)

W73-09877

STREAM CHANNEL ENLARGEMENT DUE TO URBANIZATION,
Regional Science Research Inst., Philadelphia, Pa.
For primary bibliographic entry see Field 04C.
W73-09878

WEATHER MODIFICATION: AN ECONOMIC ALTERNATIVE FOR AUGMENTING WATER SUPPLIES,
South Dakota State Dakota State Univ., Brookings. Dept. of Economics.
For primary bibliographic entry see Field 03B.
W73-10021

GEOTHERMAL WATER AND POWER RESOURCE EXPLORATION AND DEVELOPMENT FOR IDAHO,
Boise State Coll., Idaho. Dept. of Geology.
C. R. Nichols, C. E. Brockway, and C. C. Warnick.
Water Resources Research Institute, University of Idaho, Research Technical Completion Report, Project NSF-Geothermal 47-514. December 1972. 48 p, 3 tab, 3 fig, 159 ref.

Descriptors: *Geothermal studies, *Thermal springs, *Idaho, *Exploration, *Steam, Geology, Thermal powerplants, *Bibliographies, Natural resources, Hot springs, Geochemistry.

This study concentrates on a consideration of the geologic factors in the evaluation of Idaho's geothermal potential, and on the assessment of the principal commercial uses of hot waters in the State. The investigation covered geochemical sampling of five of the most promising geothermal areas known, plus two additional that seemed to warrant further study, with location, temperature, and chemical data tabulated. Areas included the Basin and Range Province, the Idaho Batholith, and the western Snake River Plain. Of the first area, the Raft River thermal waters appear to be the closest chemically to the composition of typical geothermal brines. It is concluded that the total geothermal energy available is great but the potential for power generation utilizing conventional steam hardware is limited. Investigation of hot water recreational uses at hot spring resorts reveals that there is a decline in their maintenance and development. Greater potential is seen in the use of such hot water for home heating and commercial greenhouse agriculture. There is a comprehensive bibliography. (Paylore-Arizona)
W73-10217

ATTITUDES ON ENVIRONMENTAL QUALITY IN SIX VERMONT LAKESHORE COMMUNITIES,
Vermont Univ., Burlington.
M. I. Bevins.
Northeast Regional Research Publication, Vermont Agricultural Experiment Station, Burlington, Bulletin 671, June, 1972. 46 p, 8 fig, 34 tab, 8 ref, 1 append.

Descriptors: *Attitudes, *Decision making, *Recreation, *Environmental control.
Identifiers: Seasonal homes, *Lakeshore communities.

The impact of seasonal homes on the environment is a problem of growing concern. Attitudes of residents along the shoreline of six lakes in Vermont were studied. All of the lakeshore communities were characterized by a predominance of seasonal homes owned primarily for summer use by upper middle age, well-educated, and middle-to-upper income heads-of-households. Fishing quality, algae, weeds, and plant growth were recognized problems. Scenic beauty and peaceful environment were both seen as threatened by increasing population. Opinions concerning restrictions on personal freedom due to environmental control and willingness to pay for higher environmental quality indicated a high degree of environmental consciousness among both year-round and seasonal residents. However, respondents opposed restriction of time periods during which recreational facilities could be used as well as regulations on architectural design. Community attitude surveys such as the present one were said to be of great value to planners in constructing locally supported programs. (Weaver-Wisconsin)
W73-10310

ON TAXATION AND THE CONTROL OF EXTERNALITIES,
Princeton Univ., N.J. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W73-10314

CAUSAL FACTORS IN THE DEMAND FOR OUTDOOR RECREATION,
University of New England, Armidale (Australia).
For primary bibliographic entry see Field 06D.
W73-10315

EVALUATION OF RECREATIONAL BENEFITS ACCRUING TO RECREATORS ON FEDERAL WATER PROJECTS--A REVIEW ARTICLE,
Clemson Univ., S.C.
R. M. Pope, Jr.
The American Economist, Vol 16, No 2, p 24-29, Fall 1972. 6 fig, 1 tab, 12 ref.

Descriptors: *Cost-benefit analysis, *Estimated benefits, *Indirect benefits, *Intangible benefits, Recreation, Reviews, *Federal project policy.
Identifiers: Flood Control Act of 1936, Simulated demand analysis.

The Flood Control Act of 1936 requires justification of water resource projects on the basis of cost-benefit criterion. However, cost-benefit analysis is complicated by the existence of intangible and incommensurable benefits. The author demonstrates and discusses several methods for attaching dollar value to such benefits. Simulated demand curves are shown to involve problems of determining whether the entire expenditures of recreators are in fact measures of benefits received from the use of the project. These demand curves, however, are much more adequate than other techniques, such as home interviews, trade-offs, and costs of providing recreational services. (Weaver-Wisconsin)
W73-10316

BENEFIT-COST ANALYSIS FOR WATER RESOURCE PROJECTS,
Tennessee Valley Authority, Muscle Shoals, Ala.
H. Hinote.
Center for Business and Economic Research, Tennessee University, Knoxville, June 1969.

Descriptors: *Cost-benefit analysis, *Water resources development, *Land development, *Bibliographies, Flood control, Navigation, Water quality, Recreation, Water supply, *Projects.
Identifiers: Forecasting demand.

This bibliography provides a convenient guide and source document in the field of economic analysis of water resource projects. Works cited are concerned with the current state of the art of benefit-cost analysis, and emphasis is placed on the following project purposes: (1) Flood control, (2) Navigation, (3) Water quality (Pollution), (4) Recreation, and (5) Water supply. Value enhancement of land surrounding a water resource project is also emphasized. The literature reviewed is classified into the following basic steps followed in performing benefit-cost analysis: (1) definition of the problem or the costs and benefits, (2) forecasting demand, (3) benefit measurement or cost determination, (4) evaluation techniques, and (5) decision criteria. Some works incorporate more than one of the above steps, and some may not be classified under any of the steps. In the latter case, the works are classified under the title of Basic Works. (Weaver-Wisconsin)
W73-10318

ATTITUDES TOWARDS WATER FLOURIDATION IN TURKU, (IN FINNISH),
Turku Univ. (Finland).
For primary bibliographic entry see Field 05F.
W73-10385

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

THE TEXAS WATER PLAN AND ITS INSTITUTIONAL PROBLEMS,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 06B.
W73-09756

COST APPORTIONMENT PLANNING REPORT.
Metcalf and Eddy, Inc., Boston, Mass.

Prepared fot the Metropolitan Council of the Twin Cities Area, Minnesota, November 1968. 99 p, 7 fig, 18 tab.

Descriptors: *Cost allocation, *Financing, Planning, Sewerage, Coordination, Administration, Minnesota.
Identifiers: *Metropolitan Council of the Twin Cities (Minnesota), Service areas, Policy plans.

A study of cost apportionment for the major sewerage works outlined in Metropolitan Sewer Plan, A Preliminary Concept Plan (1968) is presented. The purpose is to assist the Metropolitan Council in formulating cost apportionment and financing procedures for the construction and operation of a coordinated metropolitan-wide sewerage system. This is being undertaken within a governmental framework of the Metropolitan Council which is an overall policy-making body and the Sewer Board, appointed by the Council, which carries out detailed planning. The report includes chapters on variations of cost apportionment methods, their use in other metropolitan areas, and their application to specific service areas in the Twin Cities area. In some areas the Metropolitan Council may oversee operation and management of treatment plants which would then be treated as metropolitan works. Recommendations include the grouping of communities into service areas, the charging of costs to communities rather than individual households or firms, that charges be based on sewage flows, the creation of metropolitan loan funds to help communities construct facilities, and the creation of a metropolitan grant fund for communities with special costs because of metropolitan-wide decisions. (Elfers-North Carolina)
W73-09827

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN,
Duncan and Jones, Berkeley, Calif.; and Yoder-Trotter-Orlob and Associates, Berkeley, Calif.
For primary bibliographic entry see Field 06D.
W73-09828

INVESTMENT SEQUENCING RECOGNIZING EXTERNALITIES IN WATER DESALTING,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 03A.
W73-10018

THE ECONOMICS OF OIL TRANSPORTATION IN THE ARCTIC,
Toronto Univ. (Ontario). School of Business.
For primary bibliographic entry see Field 05G.
W73-10129

A STUDY OF THE COST EFFECTIVENESS OF REMOTE SENSING SYSTEMS FOR OCEAN SLICK DETECTION AND CLASSIFICATION,
New Hampshire Univ., Durham. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 05A.
W73-10228

A STUDY OF THE ECONOMIC IMPACT ON THE STEEL INDUSTRY OF THE COSTS OF MEETING FEDERAL AIR AND WATER POLLUTION ABATEMENT REQUIREMENTS, PART 2.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 05G.
W73-10312

ON TAXATION AND THE CONTROL OF EXTERNALITIES,
Princeton Univ., N.J. Dept. of Economics.
For primary bibliographic entry see Field 05G.
W73-10314

6D. Water Demand

PROJECTIONS OF WATER USE AND CONSERVATION IN THE USSR, 2000 (ORIYENTIROVOCHNYY PROGNOZ ISPOL'ZOVANIYA I OKHRANY VODNYKH RESURSOV SSSR NA UROVNE 2000 G.),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 06B.
W73-09804

INITIAL WATER, SEWERAGE AND FLOOD CONTROL PLAN,
Duncan and Jones, Berkeley, Calif.; and Yoder-Trotter-Orlob and Associates, Berkeley, Calif.

Prepared for the San Diego County Comprehensive Planning Organization, California, June 1972. Technical report. 68 p, 5 fig, 6 tab, 5 append. HUD P-384 (g).

Descriptors: *Planning, *Water supply, *Sewerage, *Flood control, Storm runoff, Water demand, Financing, Water quality control, California.
Identifiers: San Diego County (Calif), Utility extension planning, Land suitability.

Background and technical information used to prepare the Initial Water, Sewerage, and Flood Control Plan, Summary Report, is presented in the Technical Report. The technical information is divided into sections: (1) an evaluation of the adequacy of the water resources in the region including the availability of water supplies to meet future demands, the potential problems from wastewater discharges, and the relation between future water quality objectives and water supply requirements; (2) a forecast of 1980 water supply demands, wastewater loads, and storm water runoff; (3) an evaluation of the adequacy of existing water resources facilities in the region to meet future demands and loads; (4) an inventory and description of various financing methods including bonds, taxes, user charges and grants; and (5) a land suitability analysis to determine where urban development should occur. The report contains appendixes on beneficial use of water, water quality objectives, wastewater sources, and drainage structures. (Elfers-North Carolina)
W73-09828

SEARCH TECHNIQUE FOR PROJECT SEQUENCING,
British Columbia Hydro and Power Authority, Vancouver.
For primary bibliographic entry see Field 06A.
W73-09838

THERMAL EFFECTS OF PROJECTED POWER GROWTH: SOUTH ATLANTIC AND EAST GULF COAST RIVER BASINS,
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05C.
W73-09848

A U.S. ENERGY POLICY NOW.

Chemical Engineering, Vol 78, No 14, p 50-54, June 28, 1971.

Descriptors: *Oil, *Natural gas, *Electric power demand, Natural resources, Fossil fuels, Economics, Legislation.
Identifiers: *Energy crisis.

Oil company executives and a financial expert stress the necessity for a clear national policy that would assure increased domestic production of oil and gas. Sharp increases in taxes on production, proposals to scrap the import quota system, on-again off-again leasing policies, and delays in approval of the Alaskan pipeline undermine the basis for national planning by the oil companies, and rational investment by outsiders. The nation will not be able to resolve its energy problems by continuing to manage individual energy resources each in isolation from the other. The emergence of an energy-supply gap that can endanger the progress and security of this nation is noted along with the progressing dependence on foreign supplies. (Oleszkiewicz-Vanderbilt)
W73-09862

PUBLIC ACCESS TO RESERVOIRS TO MEET GROWING RECREATION DEMANDS.
For primary bibliographic entry see Field 06E.
W73-10273

ATTITUDES ON ENVIRONMENTAL QUALITY IN SIX VERMONT LAKESHORE COMMUNITIES,
Vermont Univ., Burlington.
For primary bibliographic entry see Field 06B.
W73-10310

CAUSAL FACTORS IN THE DEMAND FOR OUTDOOR RECREATION,
University of New England, Armidale (Australia).
R. L. Ranken, and J. A. Sinden.
The Economic Record, Vol 47, No 119, p 418-426, September 1971. 4 tab.

Descriptors: *Regression analysis, *Recreation demand, *Motivation, Water resources development, Land development, *Australia, Water demand.
Identifiers: Demand analysis.

The demand for outdoor recreation should be a major consideration in the development of land and water resources. In order that planning meet this demand, an understanding of the factors that promote recreational activities and the development of a model for predictive purposes is required. Using Australia as an example, relationships between recreational activities and family characteristics were studied. Specifically, the influence of factors other than price on the consumption of various recreation services was estimated using a sample drawn from Armidale, New South Wales, and the statistical technique of regression analysis. Various classes of recreation were used as alternative dependent variables while independent variables included measures of household income, educational level, age and sex composition, and number of holidays per year. Several results were pointed out as different from those obtained from similar analyses in the United States. (Weaver-Wisconsin)
W73-10315

6E. Water Law and Institutions

THE TEXAS WATER PLAN AND ITS INSTITUTIONAL PROBLEMS,
Texas A and M Univ., College Station. Water Resources Inst.
For primary bibliographic entry see Field 06B.
W73-09756

HUD SEWER POLICY IN URBAN RENEWAL AREAS,
Paterson Redevelopment Agency, N.J.
F. J. Blesso.
Journal of the Urban Planning and Development Division, Proceedings of the American Society of Civil Engineers, Vol 98, No UP1, July 1972. p 33-43.

Descriptors: *Urban renewal, *Sewerage, *Financing, Comprehensive planning, Water quality control, Legistlation.

HUD sewer policy in urban renewal areas has been an important influence in the construction of sanitary and storm sewers since 1949. The Housing Act of 1949 which established the basic urban renewal program provided grants for many facilities including sewers. Since then there have been many revisions to the program and several related water and sewer programs. One key policy statement was Local Public Agency Letter 415 (1967) which covered such issues as secondary treatment, separation of combined sewers, construction costs, and extensions of the sewer system beyond the renewal area. The main benefit of the policy and program has been the construction of badly needed sewer systems, while a key drawback has been the complexity of the grant procedures and the adherence to federal requirements that may produce second-best local solutions. Under revenue sharing procedures many of the drawbacks can be eliminated. Urban renewal programs should be used to explore new and innovative technology for sewer design and construction. (Elfers-North Carolina)
W73-09820

REGIONAL BENEFITS IN FEDERAL PROJECT EVALUATIONS,
Michigan Univ., Ann Arbor. School of Natural Resources.
For primary bibliographic entry see Field 06B.
W73-09830

MARINE POLLUTION,
For primary bibliographic entry see Field 05G.
W73-09905

REVIEW ON THE STATE OF MARINE POLLUTION IN THE MEDITERRANEAN SEA.
For primary bibliographic entry see Field 05B.
W73-09913

ENGINEERING COMMITTEE ON OCEANIC RESOURCES PROCEEDINGS OF THE FIRST GENERAL ASSEMBLY.

(1972). 100 p.

Descriptors: Engineering, Resources, *International commissions, *Oceans, *Environmental control, United States.
Identifiers: *Marine affairs.

The Engineering Committee on Oceanic Resources is an international, nongovernmental, professional engineering body, formed in 1971 to provide an international focus for professional engineering interests in marine affairs. It has three main purposes: to foster international professional engineering communication in marine affairs; to advise international and intergovernmental marine affairs organizations from an engineering viewpoint; and to promote the development of engineering capabilities in the use of the oceans and the enhancement of their quality, recognizing that engineering is practiced within legitimate proprietary interests. A principal part of the Assembly was devoted to discussion on engineering design to prevent abuse of the ocean. The efforts of each nation represented to maintain a high environmental quality and solutions to abating abuses of this environment are reported. (Ensign-PAI)
W73-09914

WE ARE KILLING THE OCEANS,
Senate, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10099

NATIONAL COASTAL POLLUTION PROGRAM,
Environmental Protection Agency, Washington, D.C. Office of Water Programs.
For primary bibliographic entry see Field 05G.
W73-10100

REGIONAL COASTAL POLLUTION CONTROL,
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 05G.
W73-10101

SOLUTION TO CONFLICT IN THE COASTAL ZONE: PART I--A NATIONAL COASTAL ZONE MANAGEMENT PROGRAM,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 05G.
W73-10102

INVOLVEMENT OF NOAA IN COASTAL POLLUTION MANAGEMENT,
National Oceanic and Atmospheric Administration, Rockville, Md. Office of Ecology and Environmental Conservation.
For primary bibliographic entry see Field 05G.
W73-10104

MARINE RESOURCE DEVELOPMENT, A BLUEPRINT BY CITIZENS FOR THE NORTHEAST PACIFIC.
Washington Univ., Seattle. Div. of Marine Resources.
For primary bibliographic entry see Field 05G.
W73-10222

COASTAL ZONE MANAGEMENT: INTERGOVERNMENTAL RELATIONS AND LEGAL LIMITATIONS,
Maine Univ., Portland. School of Law.
D. J. Halperin.
In: Social and Economic Aspects of Water Resources Development, Proceedings of Symposium, June 21-23, 1971, Ithaca, New York, American Water Resources Association, Urbana, Illinois, p 201-207. 1972. 56 ref.

Descriptors: *Coasts, *Federal government, *Management, *Planning, *Legislation, Regulation, Land use, Wetlands, Water resources development, Social aspects, Economics.
Identifiers: *Wetlands acts.

Selected problems of governmental management of the coasll zone are discussed. The major legal problem encountered by plans for management of the coastal zone is the Fourteenth Amendment's prohibition against the taking of life, liberty, or property without due process of law. This problem is exemplified in legislative efforts in several states to preserve the ecology of coastal wetlands. Comprehensive coastal planning, called for in recent wetlands acts, should prevent most private owners from later complaining about restrictions on the use of their property. For those cases which are challenged, the regulatory authorities should be prepared to muster evidence that in its natural state, as regulated, the property has some significant utility to the owner or evidence that the proposed modification of the area will cause direct and immediate harm to a legal interest which is conventionally protected. (Ensign-PAI)
W73-10254

REGULATION OF ACTIVITIES AFFECTING BAYS AND ESTUARIES: A PRELIMINARY LEGAL STUDY.
Texas Law Inst. of Coastal and Marine Resources, Houston.

Available from National Technical Information Service, U.S. Dep't. of Commerce as PB 212 902. $3.00 in paper copy; $0.95 in microfiche. March 1972. 25 p. NSF-GT-26.

Descriptors: *Texas, *Coastal structures, *Coastal engineering, *Governmental interrelationships, *Coasts, Beach erosion, Shores, Shore protection, Coastal plains, Bays, Estuaries, Environmental effects, Legal aspects, Dredging, Excavation, Waste disposal, Construction, Canals, Channels, Dredging, Spoil banks, Drainage, Flood control, Wells, Water pollution sources.
Identifiers: *Coastal zone management.

Federal, state, and local agencies which regulate or oversee coastal activities in Texas identified by the Bay and Estuarine Management Study are indicated by charts and graphs in this preliminary study; the study reveals gaps and overlaps in institutional authority supervising coastal zone activities. The particular areas subject to regulation are: liquid waste disposal, gaseous waste disposal, solid waste disposal, offshore and coastal construction, land canals, offshore channels, dredging and soil disposal, excavation, drainage, filling, flood control, wells, fertilizers and biocides, and traversing with vehicles. A summary of selected legislation relating to the coastal zone is also included. (Dunham-Florida)
W73-10256

SUMMARY OF SELECTED LEGISLATION RELATING TO THE COASTAL ZONE.
Texas Law Inst. of Coastal and Marine Resources, Houston.

Available from National Technical Information Service, U.S. Dept. of Commerce as PB-212 885. $3.00 in paper copy, $0.95 in microfiche. February 1972. 111 p, 36 ref. NSF-GT-26.

Descriptors: *Legislation, *Governments, *Federal-state water rights conflicts, *Water resources development, Federal jurisdiction, State jurisdiction, Law enforcement, Public rights, Regulation, Competing uses, Governmental interrelations, Coasts, Coastal engineering, Coastal structures, Administration, Comprehensive planning, Federal government, State governments, Water management (Applied), Water pollution control, Environmental effects.
Identifiers: *Coastal zone management, Coastal waters.

A preliminary summary is presented of selected legislation relating to federal and state regulation of the coastal zone, in terms of authorizing legislation, planning, financing, and enforcement which will provide the basis for detailed studies of the areas covered in further reports. The federal government, acting under the commerce clause of the Federal Constitution, has preempted substantially regulations of interstate air transportation; is mainly responsible for irrigation projects under the Federal Reclamation Laws; has the biggest role in flood control, reservoir construction, and channel improvements; and has stricter and more comprehensive legislation regarding air pollution. However, states and their political subdivisions have the primary responsibility in controlling urban runoff; have primary responsibility and authority to manage fish and wildlife; and have retained extensive control over surface transportation. Other areas of legislation studied included those affecting pollution, minerals, air pollution, commercial fishing, recreation, and ports. (Mockler-Florida)
W73-10257

STORAGE FACILITIES (FOR HAZARDOUS SUBSTANCES) REGULATION PRESENTED AT HEARING ON MARCH 21, 1973.
Missouri Clean Water Commission, Jefferson City.
For primary bibliographic entry see Field 05G.
W73-10258

(EMERGENCY) ENFORCEMENT REGULATION (TO PROTECT STATE WATERS) PRESENTED AT HEARING ON MARCH 21, 1973.
Missouri Clean Water Commission, Jefferson City.
For primary bibliographic entry see Field 05G.
W73-10259

MISSOURI WATER POLLUTION CONTROL BOARD REGULATIONS FOR TURBID WATER DISCHARGES, (TO PREVENT INTERMITTENT OR ACCIDENTAL POLLUTION OF WATERS OF THE STATE).
Missouri Water Pollution Board, Jefferson City.
For primary bibliographic entry see Field 05G.
W73-10260

ELIMINATION OF HAZARDOUS OPEN CANALS.

Hearing--Subcomm. on Water and Power Resources--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 2d Sess, June 5, 1972. 72 p.

Descriptors: *Legislation, *Safety factors, *Canal design, *Open channels, *Cost sharing, Federal government, Canals, Irrigation canals, Concrete-lined canals, Canal construction, Channels, Conduits, Conveyance structures, Ditches, Drains, Engineering structures, Water conveyance, Public health, Safety, Public benefits, Drowning, Hazards, Design, Cost allocation.
Identifiers: *Congressional hearings.

Hearings were held to take testimony on a proposed bill to authorize federal cost sharing in promoting public safety through the elimination of hazardous open canals by converting them to closed conduits and by fencing. The purpose of the legislation would be to establish cost sharing assistance for water using entities in financing protective measures for canals adjacent to urban areas. The Secretary of the Interior would be authorized to contribute up to 50% of the costs of constructing such protective devices. A text of the bill, statements and testimony of witnesses appearing at the hearing and communications relating to the proposed legislation are included for the record. Much of the criticism by opponents to the proposed bill was that the cost to the federal government was not warranted by the claimed

benefits of public health and safety. (Dunham-Florida)
W73-10267

CLOSED BASIN DIVISION, SAN LUIS VALLEY PROJECT, COLORADO.

Hearing--Subcomm. on Water and Power Resources--Comm. on Interior and Insular Affairs, U. S. Senate, 92d Cong. 2d Sess, June 26, 1972. 115 p.

Descriptors: *Legislation, *Groundwater resources, *Multiple-purpose projects, *Groundwater mining, Federal government, Groundwater, Dug wells, Groundwater availability, Groundwater basins, Groundwater potential, Surface-groundwater relationships, Water sources, Water supply, Water wells, Water law, Mexican Water Treaty, Rio Grande River, Project planning, Water management (Applied), Water distribution (Applied), Water resources development.
Identifiers: *Congressional hearings.

Hearings were held in June of 1972 to take testimony on a proposed bill authorizing the construction, operation and maintenance of the Closed Basin division, San Luis Valley project, Colorado. The project is a multipurpose water resource development which, by means of shallow wells and conveyance facilities, would collect groundwater presently being wasted and deliver it to the Rio Grande River for beneficial use. The project would assist in fulfilling Colorado's obligation under the Rio Grande Compact to deliver water at the Colorado-New Mexico state line and in fulfilling U.S. treaty obligations to deliver water to Mexico. A new wildlife refuge would also be established. A text of the bill, statements and testimony of witnesses at the hearing, and communications relating to the proposed project are included. (Dunham-Florida)
W73-10268

THE LAW OF THE SEA CRISIS--AN INTENSIFYING POLARIZATION.

Report--Comm. on Interior and Insular Affairs Part 2, US Senate, 92d Cong, 2d Sess, May 1972. 54 p.

Descriptors: *United Nations, *International law, *Law of the sea, *Governmental interrelations, *Mining, Water law, Governments, Organizations, International waters, Legal aspects, Competing uses, Public rights, Water policy, Mineralogy, Mineral industry, Oceans, Continental shelf, Beds under water.
Identifiers: *Seabed mining, Coastal waters.

This report outlines developments at the March 1972 session of the United Nations Seabed Committee and supplements a prior report on the 1971 session of the same committee. The present law of the sea, major law of the sea issues under present consideration and a history of the UN Seabed Committee are described before a more detailed account of the activities of the 1972 Committee session is presented. Present U.S. rights to mine the ocean floor are in jeopardy due to the increasing militance of a caucus of developing countries of Africa, Asia, and Latin America. Pending legislation in the U.S. Senate may soon need to be acted upon in order to prevent U.S. forfeiture of freedom of the seas, including the right to mine minerals of the seabed lying beyond the continental margin of the U.S. (Dunham-Florida)
W73-10269

BRANTLEY PROJECT.

Hearing--Subcomm. on Water and Power Resources, Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 2d Sess, January 25, 1972. 84 p.

Descriptors: *Flood control, *Legislation, *Multiple-purpose projects, *River basin development, New Mexico, Dams, Diversion, Diversion structures, Erosion control, Flood plains, Flood protection, Reservoirs, Water distribution (Applied), Water management (Applied), Water policy, Project feasibility, Project planning, Project purposes, Administration, Water resources development, Federal government.
Identifiers: *Congressional hearings, *Brantley Project, Pecos River basin.

Hearings were held in January of 1972 to take testimony on a proposed bill authorizing the Secretary of the Interior to construct, operate and maintain the Brantley Project in the Pecos River Basin of New Mexico. The project was recommended by the Bureau of Reclamation to improve existing reclamation projects in that area which, because of reservoir silting and inadequate spillways, created a potential flood hazard. Replacement storage for the existing projects, irrigation water supplies, recreation, and conservation of fish and wildlife resources would also be provided by construction of the Brantley Project. The statements and testimony of interested persons both within and outside the federal government are reported. Communications relating to the project sent to the Senate committee are also included. (Dunham-Florida)
W73-10270

DEVELOPMENT OF HARD MINERAL RESOURCES OF THE DEEP SEABED.

Hearing--Subcomm. on Minerals, Materials, and Fuels--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 2d Sess, June 2, 1972. 77 p.

Descriptors: *Legislation, *Mining, *Beds, Oceans, Mineral industry, Legal aspects, Water resources development, International law, United Nations, Beds under water, Law of the sea, International waters, Governmental interrelations, Penalties (Legal), Permits.
Identifiers: *Seabed mining, *Congressional hearings, Licenses, Water rights (Non-riparians).

S.2801 would provide the Secretary of the Interior with the authority to promote the conservation and orderly development of the hard mineral resources of the deep seabed, pending adoption of an international regime therefor. A great deal of criticism was directed toward this proposed bill. Some witnesses indicated that the bill would fly in the face of United Nations Resolutions, would negate basic principles of the U.S. Draft Seabed Treaty, would damage the U.S. position in negotiations at the United Nations Seabed Committee, would threaten the world's best present opportunity to move toward the rule of just law, and would injure the interests of the U.S. in peace, world order, the environment and an equitable sharing of the world's resources. Alternatives to the proposed bill would include no exploitation at all, the unregulated and virtually unlimited exploitation by corporations and nations of these resources, or international supervision and issuance of licenses to exploit a certain amount of minerals over a period of years. Overall, the testimony presented recommended defeat of the bill. (Mockler-Florida)
W73-10271

THIRD ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY.

Hearing--Subcomm. on Public Health and Environment--Comm. on Interstate and Foreign Commerce, U.S. House of Representatives, 92d Cong, 2d Sess, August 16, 1972. 30 p.

Descriptors: *Water pollution control, *Legislation, *Environmental control, *Pollution abatement, Federal government, Ecology, Environment, Social aspects, Environmental effects, Environmental sanitation, Air pollution, Pollutants, Public health, Radioactive wastes, Toxins, Solid wastes, Waste disposal, Water pollution, Water quality, Natural resources, Comprehensive planning.
Identifiers: *Congressional hearings, *Council on Environmental Quality, Noise pollution, Hazardous substances (Pollution).

This hearing was held to receive testimony of members of the Council on Environmental Quality, (CEQ), with respect to the third annual report on the state of the environment by the CEQ. The subcommittee chairman asked to hear comments relating both to an overview of the total environmental situation in the United States and on the effects of recently passed environmental laws relating to air pollution, solid waste pollution, radiation and noise. Statements and testimony of various CEQ members are included along with additional material submitted for the record by the CEQ. These additional materials relate to proposed toxic waste disposal control act, CEQ cost estimates from 1971 to 1980, pollution control at federal facilities, status of the Army's hybrid combustion engine program, and additional funding to carry out the responsibilities of the National Oil and Hazardous Substances Pollution Contingency Plan. (Dunham-Florida)
W73-10272

PUBLIC ACCESS TO RESERVOIRS TO MEET GROWING RECREATION DEMANDS.

Hearing--Subcomm. of the Comm. on Government Operations, U.S. House of Representatives, 92d Cong, 1st Sess, June 15, 1971. 192 p.

Descriptors: *Federal government, *Reservoir operation, *Recreation facilities, *Public access, Administration, Reservoirs, Recreation, Water management, Administrative agencies, Coordination, Water resources development, Social impact, Recreation demand, Fringe benefits, Water allocation (Policy), Water utilization, Water policy, Public health, Reasonable use, Multiple-purpose-projects.
Identifiers: *Congressional hearings.

Hearings held before a House Subcommittee of the Committee on Government Operations indicate that the Nations's population growth, coupled with increased leisure time, has led to an ever-expanding demand for public recreational opportunities, such as fishing, hunting, swimming, boating, and camping. Since reservoirs at federal or federally-aided water resource projects offer an excellent opportunity to meet these mounting recreational demands, the Subcommittee held hearings to determine whether the federal agencies involved in reservoir projects are making these valuable recreational resources available for the benefit of the American public. The subcommittee heard from representatives of the Interior Department, Corps of Engineers; Tennessee Valley Authority; the Soil Conservation Service; the Kansas Forestry, Fish, and Game Commission; and several conservation organizations. The report also indicates the extent of the subcommittee's long and continuing interest in these federal agencies' policies as they relate to public access to reservoirs financially aided by federal funds. (Mockler-Florida)
W73-10273

WESTLANDS WATER DISTRICT.

Hearing--Subcomm. on Water and Power Resources--Comm. on Interior and Insular Affairs, U.S. Senate, 92d Cong, 1st Sess, December 6, 1971. 25 p.

Descriptors: *California, *Legislation, *Land management, *Agriculture, *Government finance, Irrigation, Land use, River basin development, Farm management, Reclamation, Financing, Cost sharing, Water management (Applied).

Identifiers: *Congressional hearings.

H. R. 1682 would provide for deferment of construction charges payable by the Westlands Water District attributable to lands of the Naval Air Station in Lemoore, California. The bill would provide authorization for the Secretary of the Navy to lease lands owned by the federal government for grazing or agricultural purposes in accordance with sound land management practices. The proceeds from the leases would go to reclamation funds. Acreage limitations would be imposed and direct charges for water would be paid by the various lessees to the Westlands Water District on a cost plus expenses basis. In order to assure that the contemplated national defence purposes are served, the bill would give the Secretary of the Navy the authority to include in the leases various provisions on cancellation, use of the land, and other terms of the lease. The lands covered by the bill consist of 19,752 acres, 12,000 of which acres have already been leased for agricultural purposes since 1958. (Mockler-Florida)
W73-10274

SAN ANGELO PROJECT, TEXAS.

Hearing--Subcomm. on Water and Power Resources--Comm. on Interior and Insular Affairs, United States Senate, 92d Cong, 1st Sess, September 9, 1971. 19 p.

Descriptors: *Legislation, *Reservoirs, *Government finance, *Water supply development, Flood control, Planning, Water resources development, Regulation, Water supply, Impoundments, Water yield, *Texas, Water management (Applied), Municipal water, Water shortage, Droughts, Cost sharing.
Identifiers: *Congressional hearings, *San Angelo (Tex).

S.1151 would authorize the Secretary of the Interior to revise a repayment contract with the San Angelo Water Supply Corporation in San Angelo, Texas. Specifically, the bill would provide financial relief to the municipality and extend the repayment contract from 40 to 50 years. A portion of the operating costs would be credited against the corporations debt to flood control, fish and wildlife conservation and make them nonreimbursible, and otherwise use any and all available funds to carry out the project. The Twin Buttes Reservoir is the principal feature of the San Angelo project. Its active capacity is 632,000 acre-feet, of which 177,800 acre-feet are active conservation storage and 454,000 acre-feet are flood control space. The significance of the proposal is due to the fact that the San Angelo area has experienced severe drought in recent years and has not been able to build up a reserve of water for the future. (Mockler-Florida)
W73-10275

UNDERWATER LANDS.

Del. Code Ann. Tit. 7, secs. 6401 thru 6440 (Supp. 1970).

Descriptors: *Delaware, *Legislation, *Mining, *Leases, Mineral industry, Dredging, Drilling, Exploration, Ownership of beds, Exploitation, Oil fields, Investigations, Oil wells, Research and development, Seismic studies, Sites, Subsurface investigations, Water pollution, Water pollution sources, Water pollution control, Oil, Natural gas, Permits, Administrative agencies, Environmental effects.

The Governor and the Water and Air Resources Commission, (Commission), have exclusive jurisdiction to lease for mineral exploration and exploitation all ungranted submerged tidelands owned by the state of Delaware. The Commission is empowered to administer and control all such lands and to lease such lands as provided. Specifically, the Commission is to exercise control over surveys, forms of leases and permits, royalties, rental of leased lands, pollution, joint exploration, and interests in leases. The Commission is authorized to promulgate reasonable rules, regulations, and orders necessary to administer operations to remove minerals from submerged state lands. All leases and permits must be subject to prior federal approval from the Department of Defense. The Commission may delegate the State Geologist to act in its behalf under these provisions. (Dunham-Florida)
W73-10276

WATER POLLUTION.

Del. Code Ann. tit. 7, secs. 6301 thru 6307 (Supp. 1970).

Descriptors: *Delaware, *Legislation, *Water pollution control, *Sewage treatment, Standards, Water pollution, Impaired water quality, Industrial wastes, Municipal wastes, Pollutants, Public health, Sewage, Treatment facilities, Waste treatment, Water pollution sources, Water pollution treatment, Water quality standards, Water resources, Water utilization, Administrative agencies, Governments, Legal aspects, Environmental effects, Adjudication procedure.
Identifiers: Injunctive relief, Administrative regulations.

In carrying out state policy of maintaining a reasonable quality of water consistent with public health and enjoyment, protection of wildlife, and industrial development of the state of Delaware, it is the purpose of these provisions to control any existing pollution and prevent new pollution. The Water and Air Resources Commission, (Commission), is empowered to regulate water pollution through rules, regulations and orders after notice and hearing. The Department of Natural Resources and Environmental Control, (Department), is empowered to exercise supervision over administration and enforcement of state water pollution laws, and may issue special orders after notice and hearing to secure control of pollution of state waters. On request, political entities and industrial concerns are required to furnish the Commission or the Department with information pertinent to the discharge of their duties. The Commission may take summary action prior to a hearing to protect the public health and may seek injunctive relief against violations of its final orders. All plans for construction or alteration of sewage systems must be submitted to the Department for approval prior to commencement. (Dunham-Florida)
W73-10277

REGULATION OF WATER RESOURCES.

Del. Code Ann. tit. 7 secs 6101 thru 6106 (Supp. 1970).

Descriptors: *Delaware, *Legislation, *Water resources development, *Water management (Applied), Water resources, Water rights, Water control, Water distribution (Applied), Water law, Governments, Administration, Administrative agencies, Water pollution, Water pollution control, Water sources, Water quality, Public health, Safety, Natural resources, Environmental effects, Water quality control, Delaware River Basin Commission, Adjudication procedure, Comprehensive planning.
Identifiers: Injunctive relief, Administrative regulations.

In fulfilling a policy to plan for and regulate the water resources of the state to assure optimal beneficial use, the Delaware Water and Air Resources Commission (Commission) shall formulate and adopt a statewide comprehensive master plan for development and use of state water resources after holding public hearings. The Commission is empowered to issue rules, regulations and orders to carry out its duties. The Department of Natural Resources and Environmental Control shall advise the Delaware River Basin Commission, study and investigate matters concerning water use in the state, approve the allocation and use of state waters, and approve plans for water facilities. No increase in the amount of water used within the state shall be made without prior approval of the Department, excepting municipal users supplying nonindustrial subscribers or for emergency purposes. The Department shall designate by regulation those increases which will be approved by simple notice and those requiring a public hearing. The Commission is provided authority to seek injunctive relief for violations of its final orders. (Dunham-Florida)
W73-10278

CONSERVATION--LICENSING POWERS.

Del. Code Ann. tit. 7, secs. 6021 thru 6024 (Supp. 1970).

Descriptors: *Delaware, *Legislation, *Well regulations, *Well permits, *Water wells, Water resources development, Water resources, Water law, Water rights, Water quality, Drilling, Legal aspects, Administrative agencies, Water conservation, Wells, Regulation, Permits, Drill holes, Pumping, Pumps, Water sources, Test wells, Water supply, Governments, Groundwater resources, Groundwater mining.
Identifiers: *Licenses.

No well water contractor shall contract for or engage in the construction, repair or installation of a water well, test wells or pumping equipment until he has received a license from the Delaware Water and Air Resources Commission, (Commission); any activity related to the above shall be under the supervision of a licensed water well contractor. The grant or denial of a license shall be based on an examination to determine whether applicant has sufficient knowledge of the proper method of constructing water wells and the rules and regulations of the Commission pertaining to water wells. The Commission is empowered to enact rules and regulations to effectuate the above provisions. A water well contractor is defined as an individual firm or corporation with whom a contract is made for constructing or repairing a well or test well or installing pumping equipment in a well or test well. (Dunham-Florida)
W73-10279

CONSERVATION--GENERALLY.

Del. Code Ann. tit. 7, secs 6001 thru 6017 (Supp. 1970).

Descriptors: *Delaware, *Legislation, *Water resources development, *Water pollution control, Air environment, Air pollution, Air pollution effects, Water pollution, Water resources, Water law, Water quality, Water management (Applied), Water pollution sources, Environmental effects, Public health, Safety, Conservation, Administrative agencies, Adjudication procedure, Legal review, Permits, Penalties (Legal), Law enforcement, Jurisdiction.
Identifiers: Administrative regulations.

In an attempt to fulfill the policy of preservation and conservation of water and air resources within the state of Delaware, the development, utilization and control of these resources are placed in the hands of the Water and Air Resources Commission, (Commission), and the Department of Natural Resources and Environmental Control, (Department). The organization and procedure for the appointment of Commission members is set forth. The Secretary of the Department is charged with attempting to correct violations of rules or regulations of the Department, and provisions for a public hearing are included in the event the person

charged does not comply. Individuals whose interests are affected by any action or order of the Secretary may appeal to the Commission and then the Superior Court. The Secretary is also authorized to hold hearings with respect to permits, leases or grants. The Commission is authorized to adopt rules and regulations in accord with state policy and issue general and specific orders after public hearings. Again, an appropriate appeal procedure is set forth. The Commission is authorized to issue temporary, emergency orders when no procedure to control hazardous operations exists prior to enacting more permanent procedure. (Dunham-Florida)
W73-10280

DRAINAGE OF LANDS; TAX DITCHES--PRELIMINARY PROVISIONS.

Del. Code Ann. tit. 7, secs. 4101 thru 4104 (Supp. 1970).

Descriptors: *Drainage districts, *Delaware, *Legislation, *Controlled drainage, *Flood control, Drainage area, Drainage effects, Drainage systems, Arable land, Ditches, Land management, Soil water movements, Surface waters, Watersheds (Basins), Irrigation effects, Soil-water-plant relationships, Administrative agencies, Public health, Environmental effects, Flood prevention, Drainage programs.

It is declared that the drainage and prevention of flooding of susceptible lands shall be considered a public benefit and conducive to public health, safety and welfare. This chapter provides a basis for a uniform system for establishing, financing, administering, and maintaining drainage organizations in the state of Delaware under the supervision of the Department of Natural Resources and Environmental Control in order to conserve the state's resources. Drainage means water management, by drainage areas or watersheds, to safely remove or control excess surface flood waters and damaging, excess sub-surface waters. Landowners who desire their lands to be drained or protected from flooding and landowners served by a drainage organization prior to June 1, 1951 established under state law may petition for establishment of a Tax Ditch. If a drainage organization already exists the present assets for liabilities may be transferred to the Tax Ditch as provided. (Dunham-Florida)
W73-10281

NATURAL AND SCENIC RIVERS SYSTEM.
La. Rev. Stat. secs. 56:1841 thru 56:1849 (Supp. 1973).

Descriptors: *Louisiana, *Legislation, *Aesthetics, *Environmental control, *River basin development, Water conservation, Wildlife conservation, Land conservation, Preservation, Protection, Geologic controls, Streams, Administrative agencies, Recreation, Fish management, Scenery, Project planning, Ecology, Natural streams, Stream improvement, Wildlife management.
Identifiers: *Scenic rivers.

This chapter provides for the establishment of the Louisiana Natural and Scenic River System to be administered by the Louisiana Wildlife and Fisheries Commission. The system is to be administered for the purposes of preserving, protecting, developing reclaiming and enhancing the wilderness qualities, scenic beauties and ecological regimen of certain free-flowing streams or segments thereof. The provisions call for full and equal consideration to be given to potential natural and scenic river areas. All river basin reports and project plans should discuss any such potential and all economic evaluations should consider aesthetic as well as monetary values. No state agency may authorize or concur in plans of local or federal agencies that would detrimentally affect a natural or scenic river or upon which full and equal consideration as above stated has not been discussed or evaluated. Channelization, clearing and snagging, channel realignment and reservoir construction of those rivers and streams included within the system is prohibited. Included is a list of natural and scenic rivers. Recognizing that some streams recommended for inclusion may be privately owned, the legislature encourages such owners to grant to the system administrator scenic easements and surface easements. (Napolitano-Florida)
W73-10282

PROHIBITIONS ON CERTAIN DETERGENTS.

Ind. Ann. Stat. secs 35-5101 thru 35-5107 (Supp. 1972).

Descriptors: *Indiana, *Legislation, *Detergents, *Alkylbenzene sulfonates, *Phosphorus, Water pollution control, Water pollution, Water pollution sources, Chemical wastes, Chemicals, Soaps, Sulfonates, Phosphates, Water pollution treatment, Water quality, Water quality control, Permits, Legal aspects, Penalties (Legal), State governments, Administrative agencies, Administrative decisions, Water policy, Nutrients.
Identifiers: Injunctive relief.

It is unlawful to use, sell or otherwise dispose of any detergent containing alkylbenzene sulfonate (ABS) within the state of Indiana or into the boundary waters of this state. Prior to January 1, 1973, it is unlawful to use, sell or dispose of detergent containing more than 8.7% phosphorus by weight as determined by current applicable standards; after that date it shall be unlawful to use, sell or dispose of detergent containing any amount phosphorus by weight. An exception as to the effective date is provided for institutional or commercial users. These provisions do not apply to a detergent or cleaning compound contained in fuel or lubricating oil. The Stream Pollution Control Board shall enforce these provisions and is authorized to adopt reasonable rules and regulations consistent with this chapter. Penalties, including the availability of injunctive relief, are provided for violations of these provisions. (Dunham-Florida)
W73-10283

PROSPECTING AND DEVELOPMENT OF PETROLEUM PRODUCTS IN RIVER BEDS, LAKE BEDS, AND SHORELANDS--PREFERENTIAL RIGHTS.

Ind. Ann. Stat. secs. 46-1620 (Supp. 1972).

Descriptors: *Indiana, *Exploration, *Legislation, *Oil, Natural resources, Natural gas, Banks, River beds, Lake beds, Drilling, Oil industry, Subsurface investigation, Shores, Land use, Oil wells, Administration, Legal aspects, Permits, Regulation, Leases, Adjacent landowners, Contracts.
Identifiers: *Petroleum products.

In the case of any application for prospecting permits or leases to river beds, lake beds, and shorelands, the owners of the right to prospect for and develop and produce petroleum from the abutting lands shall have a preferential right for a period of 30 days, after he has received notice of such application, to a prospecting permit, or if petroleum has been discovered in commercial quantities, in any structure underlying such abutting lands, a lease to the portion of such river bed, lake bed and shorelines as adjoin such abutting lands upon the terms and conditions provided. The authorized state agency dealing with these applications has the power to withold any tracts of public land from prospecting or leasing for petroleum purposes if the best interest of the state will be served by doing so. All leases, permits or other contracts of public lands for the development of oil and gas entered into by the state or any of its political subdivisions subsequent to April 11, 1944, are declared to be in full force and effect. (Reed-Florida)
W73-10284

PLUGGING WELLS--DECLARATION OF POLICY, AND ADMINISTRATIVE REGULATION.

Ind. Ann. Stat. secs.33 thru 46-1740 (Supp. 1972).

Descriptors: *Indiana, *Water pollution control, *Well regulations, *Oil wells, *Legislation, Oil spills, Drilling, Injection wells, Test wells, Saline water intrusion, Exploration, Oil industry, Legal aspects, Penalties (Legal), Water pollution, Subsurface investigation, Legal review, Administrative decisions, Water conservation.
Identifiers: *Well plugging, Administrative regulations.

If, after notice and hearing, the Indiana Department of National Resources finds that a well drilled for the exploration, development, or production of oil or gas, or as an injection or salt water disposal well, geological structure test well, gas storage well or gas storage observation well, has been abandoned and is leaking or may result in the leaking of deleterious substances into any fresh water formation or onto the surface of the land in the vicinity of the well, and if the situation has not been remedied within a specified time, then the department or any person or agency duly authorized by the department may repair or plug the well. In the case of an emergency no notice or hearing is required. Any person who acts pursuant to the authority granted in the statute shall not be held liable for any damages resulting from reasonably necessary operations, nor shall he be held liable for future remedial work. Any person who acted under this statute shall have a cause of action, against the person who was obligated by law to repair the well, for the reasonable costs and expenses incurred for such repairs. (Reed-Florida)
W73-10285

FERRIES ON STREAMS BORDERING STATE.

Ind. Ann. Stat. secs. 36-2506 thru 36-2512 (Supp. 1972).

Descriptors: *Indiana, *Legislation, *Ferry boats, *Navigation, *Permits, Transportation, Adjudication procedure, Penalties (Legal), Regulation, State governments, Legal aspects, Local governments.
Identifiers: *Licenses.

No person or corporation is permitted to maintain a public ferry across any lake, river or stream running through or bounding any city or town in the state of Indiana without first having obtained a license from the common council or board of town trustees of the proper city or town for that purpose. The requirements that must be met prior to the granting of the license are specified herein. The rates of ferriage, reasonable rules for operation and the schedule upon which such ferry shall be operated is to be fixed by the common council or board of town trustees. If the ferrykeeper, or any user of such ferry, be aggrieved by the establishing of such rates, rules or schedule, he has the right to appeal to the circuit court of the proper county. The statute provides a penalty for the violation of the conditions of the license. (Reed-Florida)
W73-10286

AN ACT TO PROVIDE FURTHER FOR WATER POLLUTION CONTROL, ESTABLISHING A NEW WATER IMPROVEMENT COMMISSION AND PRESCRIBING ITS JURISDICTION,

POWERS, AND DUTIES.

Act No. 1260, Acts of Alabama, p. 2175-2190, 1971.

Descriptors: *Alabama, *Water quality standards, *Permits, *Water pollution control, *Legislation, Water quality control, Public health, Administrative agencies, Pollution abatement, Administrative decisions, Waste disposal, Law enforcement, Legal review, Penalties (Legal), Damages, Federal Water Pollution Control Act.
Identifiers: Notice.

The Water Improvement Commission is charged with controlling water pollution within Alabama. Water quality standards shall be set following public notice and a hearing by the Commission. Such standards must take into account present and future uses, the public interest and other policies relating to existing or proposed future pollution. The Commission shall issue permits for all waste discharges into waters of the state. Any person discharging, or applying to discharge pollution into waters of the state may be required to maintain records, file reports and use monitoring equipment. Only the Commission, the Attorney General or a District Attorney may bring an action to enforce this statute. Those found in violation of the act may be liable for criminal fines and for civil damages covering clean up costs as well as expenses for restocking any fish killed or replenishing any wildlife killed. Provisions are included on membership of the Commission and judicial review of orders or decisions of the Commission. (Mockler-Florida)
W73-10287

TOMBIGBEE VALLEY DEVELOPMENT AUTHORITY.

Ala. Code tit. 38, secs. 126 (1) thru 126 (15) (Supp. 1971).

Descriptors: *Alabama, *Legislation, *Inland waterways, *Bond issues, *Administrative agencies, Channels, Surface waterways, Regulation, Administrative decisions, Water management (Applied), Comprehensive planning, Water resources, Water supply, Water supply development, Water utilization, Governments, Surface water availability, Conservation, Agriculture, Industry, Recreation, Tennessee River, Transportation.
Identifiers: *Tombigbee River.

To implement the construction of a navigable waterway between Demopolis and the Tennessee River utilizing the channel of the Tombigbee River to promote water conservation and supply, flood control, irrigation, industrial development and public recreation in the Tombigbee River basin, the legislature authorizes the formation of a public corporation. The corporation, in conjuction with other state and federal agencies, is authorized to undertake all obligations and perform all actions necessary to complete the project. Provisions for the establishment and administration of the corporation are provided, and the corporation is authorized to issue bonds and collect the proceeds therefrom. A provision for dissolution of the public corporation when no duties or obligations remain is included. (Dunham-Florida)
W73-10288

DISCHARGE OF SEWAGE AND LITTER FROM WATERCRAFT.

Ala. Code tit. 38, secs. 97 (36) thru 97 (47) (Supp. 1971).

Descriptors: *Alabama, *Legislation, *Recreation wastes, *Water pollution sources, *Boats, Administrative agencies, Boating, Litter, Wastes, Disposal, Environmental sanitation, Waste disposal, Water pollution, Water quality, Public health, Sewage disposal, Recreation, Water utilization, Water policy, Safety, Recreation facilities, Law enforcement, Legal aspects, Penalties (Legal), Ecology.
Identifiers: Marine toilets, Hazardous substances (Pollution), Nuisance (Legal aspects).

No person shall deposit or discharge into the waters of this state materials from watercraft detrimental to the public health or to the enjoyment of water for recreational purposes. The Board of Health is authorized to formulate rules and regulations to effectively carry out these provisions. Provisions specifically related to marine toilets, on-shore trash receptacles, and a public education program are included. To enforce rules, regulations and orders of the Board of Health, provisions for prosecution and penalties are provided. Definitions of watercraft, sewage, litter, and marine toilet are listed. (Dunham-Florida)
W73-10289

SEWAGE COLLECTION, ETC., FACILITIES.

Ala. Code tit. 22, secs. 140 (13) thru 140 (18) (Supp. 1971).

Descriptors: *Alabama, *Legislation, *Sewage disposal, *Sewage treatment, Administrative agencies, Regulation, Permits, Administrative decisions, Project planning, Legal aspects, Penalties (Legal), Sewage, Sanitary engineering, Sewage districts, Water pollution, Water pollution sources, Wastes, Sewerage, Cities, Plumbing, Public health, Ecology, Environmental effects, Water management (Applied).

It is unlawful to build, maintain, or use insanitary sewage facilities within the State excluding plumbing within structures located within and regulated by municipal corporations. The State Board of Health and/or county boards are empowered to require proper sewage facilities conforming with specifications, rules and regulations adopted by these boards. All plans and specifications applying to sewage collection, treatment, and disposal must be approved by the state and/or county boards in conformance with their standards. Municipal corporations are empowered to issue permits relating to the installation within structures located in their jurisdiction; but permits relating to the installation of plumbing serving structures outside their jurisdictions must be issued in accordance with state and/or county board requirements. Penalties are provided for violation of these provisions. (Dunham-Florida)
W73-10290

ALABAMA WATER WELL STANDARDS.

Ala. Code Tit. 22, secs 140 (19) thru 140 (29) (Supp. 1971).

Descriptors: *Alabama, *Legislation, *Water wells, *Well permits, *Well regulations, Legal aspects, Permits, Regulation, Drilling, Wells, Casings, Water conservation, Drill holes, Excavation, Groundwater, Pumping, Well spacing, Penalties (Legal), Law enforcement, Administrative agencies, Administrative decisions, Administration, Governments, Water management (Applied).
Identifiers: *Licenses, Administrative regulations.

Every person who intends to drill water wells in Alabama shall annually apply for and obtain a license. The Alabama Water Wells Standard Board is empowered to promulgate and publish rules and regulations in this regard; other provisions included herein set forth the Board's membership and authority. No person may attempt to drill or repair a water well unless under the supervision of a licensed driller. The criteria for refusal, suspension, revocation and renewal of licenses are provided with a requirement of Board notice and a hearing on the matter if requested. Any person aggrieved by an act or decision of the Board may appeal to the circuit court. Each application for a well driller's license is to be accompanied by a surety bond for $1,000. Penalties for violation of these provisions or for violation of rules and regulations established by the Board are included. (Dunham-Florida)
W73-10291

ALLISON V. FROEHLKE (CHALLENGE TO ENVIRONMENTAL IMPACT STATEMENT OF RESERVOIR PROJECT).

470 F.2d 1123-1128 (5th Cir. 1972).

Descriptors: *Texas, *Judicial decisions, *Environmental effects, *Dam construction, Dams, Reservoirs, Water law, Water policy, Legal aspects, Legislation, Remedies, Flood control, Eminent domain, Wildlife conservation, Wildlife habitats, Wildlife, Legal review.
Identifiers: *Environmental Impact Statements, *National Environmental Policy Act.

Plaintiff landowners sought a permanent injunction against the construction of three reservoirs and dams in the Brazos River Basin by the defendant Army Corps of Engineers. The plaintiffs contended that the project as presently planned had not been so authorized by Congress and violated specific environmental statutes, including the National Environmental Policy Act. The Fifth Circuit Court of Appeals affirmed the lower court's denial of the injunction and held that the project was authorized, even though the plans did not conform exactly to those contained in the original Congressional approval. Further, neither the fact that the environmental impact statement, (EIS), relating to the project failed to refer to certain specific animals, nor the absence of a botanist, zoologist, demographer or economist on the staff writing the EIS renders it statutorily defective. (Glickman-Florida)
W73-10292

HARELSON V. PARISH OF EAST BATON (SUIT FOR DAMAGES FOR PARISH'S FAILURE TO COMPLETE DRANAGE PROJECT).

272 So. 2d 382 (Ct. App. La. 1973).

Descriptors: *Louisiana, *Drainage, *Spoil banks, *Damages, Drainage engineering, Drainage programs, Local governments, Water law, Water policy, Legal aspects, Judicial decisions, Easements, Remedies, Erosion control, Farm management, Erosion, Slope protection.

Plaintiff landowner granted a drainage servitude to the defendant parish for the purposes of widening a major drainage artery. Defendant allegedly breached the contract by not distributing spoil from the excavation in accordance with the agreement; the spoil was to be distributed so as to prevent erosion of the banks. The trial court held for the plaintiff, and the appellate court affirmed but modified the decision. It awarded damages first in the amount that it would cost the plaintiffs to regrade the channel bank to the condition in which it should have been delivered to them, and additional damages for the defendant's failure to burn brush piles created during the performance of the widening task. Finally plaintiffs were awarded damages for the loss of use of their entire tract for pasture purposes because of the defendant's failure to properly fence and grade the project in accordance with the contract. (Glickman-Florida)
W73-10293

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND V. MADEIRA BEACH NOMINEE, INC. (OWNERSHIP OF LAND ACCRETED DUE TO PUBLIC IMPROVEMENT PROJECT).

272 So. 2d 209 (Fla. App. Ct. 1973).

Descriptors: *Florida, *Riparian rights, *Accretion (Legal aspects), *Water rights, Sea walls, Water law, Water policy, Legal aspects, Riparian waters, Bank erosion, Boundaries (Property), Retaining walls, Shore protection, Erosion control, Erosion, Judicial decisions, Riparian land, Boundary disputes.
Identifiers: Public trust doctrine.

Plaintiff state agency sued to enjoin the construction of a seawall by defendant riparian landowner on land accreted due to a municipal erosion control project. Defendant cross-claimed to quiet title to the accreted land. Plaintiff contended that defendant did not become the owner of land which accreted due to a public improvement project. The Florida District Court Appeals held that title to accreted lands vests in the riparian owners of abutting lands unless the riparian himself causes the accretion. The court also refused to give retroactive application to a Florida statute which purported to vest title to accretions caused by public works in the state. Thus, the judgment of the trial court was affirmed and the title to the accreted land was vested in defendant. However, the court noted that if the state could show that erection of the seawall would endanger the erosion control project, an injunction would be proper to prevent its construction. (Glickman-Florida)
W73-10294

ADAM V. GREAT LAKES DREDGE AND DOCK COMPANY (SUIT TO RECOVER DAMAGES FOR DESTRUCTION OF OYSTER BED).

273 So. 2d 60 (Ct. App. La. 1973).

Descriptors: *Louisiana, *Oysters, *Dredging, *Beds under water, Shellfish farming, Streambeds, Beds, Judicial decisions, Water law, Water policy, Legal aspects, Civil law, Water rights.

Plaintiff owner of a lease of certain water bottoms for oyster harvesting, sued defendants, a dredging company, the Parish owning the waterway dredged, and the state of Louisiana, from whom he had obtained the oyster lease, for damages resulting from trespassing upon the leasehold and destroying the oysters. The complaint was dismissed as to the state by the trial court, but on appeal it was held that a cause of action against the state was stated by the allegation that the plaintiff had obtained from the state the lease of water bottoms for oyster purposes, and that the dredging was done by a third party under the supervision of the state. The court therefore remanded the case with the state as a party defendant. (Glickman-Florida)
W73-10295

CALE V. WANAMAKER (ACTION FOR DECLARATORY JUDGMENT GRANTING RIGHT OF WAY OVER DEFENDANTS' LANDS WHERE THE ONLY ACCESS TO PLAINTIFFS' PROPERTY WAS BY NAVIGABLE WATER).
296 A.2d 329 (N.J. 1972).

Descriptors: *New Jersey, *Easements, *Right-of-way, *Judicial decisions, Legal aspects, Bays, Adjacent landowners, Boundaries, Boundary disputes, Riparian lands.

Plaintiffs owned a lot surrounded by lots belonging to defendants and a bay. They sought a declaratory judgment to determine whether they had a right-of-way over defendants' land, either by way of necessity or by an implied grant of quasi-easement. Plaintiffs had used as access to their lot the land of a former railroad right-of-way, but that use was restrained, and the plaintiffs only lawful means of access was by way of water. The court held that an implied grant of quasi-easement did not exist, because there was no pre-existing use upon which to support it. However, they further decided that a way of necessity does not rest on a pre-existing use, but on a need for a way across property. As long as there had at one time been a unity of title, a way of necessity may pass through several transfers and be exercised at any time. The court found an implied way of necessity across defendants' land in favor of plaintiffs. (Glickman-Florida)
W73-10296

MUNICIPAL WATER AND SEWER AUTHORITY OF CENTER TOWNSHIP, BUTLER COUNTY V. NORTHVUE WATER COMPANY, INC. (ACTION TO DIRECT SEWER AND WATER AUTHORITY TO SUPPLY WATER TO UTILITY COMPANY).
298 A.2d 677 (Commonwealth Ct. Pa. 1972).

Descriptors: *Pennsylvania, *Water districts, *Water supply, *Adjudication procedure, Legal aspects, Rates, Administrative decisions, Local governments, Water law, Water allocation (Policy), Equity, Water rates, Municipal water, Water demand, Legislation, Judicial decisions.

Complainant public utility water company filed a complaint requesting a mandatory injunction directing defendant municipal sewer and water authority to supply necessary water at reasonable rates. The state department of health had ordered the complainant to find another water supply; complainant applied to and was refused service by the defendant. The appeals court held that the complainant's request that defendant supply water to complainant for service to complainant's customers within the municipality came within the meaning of the word service in the applicable governing statute. This statute provided procedures for challenging the reasonableness of the defendant's services and the court held complainant had to follow this exclusive procedure provided for in the statute and could not in the alternative bring a suit in equity in order to rectify the situation. (Mockler-Florida)
W73-10297

PROPERTY OWNERS ASSOCIATION OF BALTIMORE CITY, INC. V. MAYOR AND CITY COUNCIL OF BALTIMORE (LANDLORD'S SUIT TO HAVE WATER SERVICE IN TENANT'S NAME AND NOT HIS OWN).
299 A.2d 824 (Ct. App. Md. 1973).

Descriptors: *Water supply, *Maryland, *Water rights, *Local governments, Legal aspects, Water utilization, Rates, Water law, Judicial decisions, Municipal water, Water costs, Water rates.

This case involved an action on a bill of complaint brought by plaintiff landlord and others against the defendant city seeking a declaratory judgment with respect to an agreement of a tenant to pay directly to the city for all water charges. Plaintiff also sought a writ of mandamus against the mayor or the city council requiring the placement of the tenant's name on the water account and the mailing of water bills in the name of the tenant. The appeals court held that where a landlord stood in the shoes of an owner who had signed and filed with the city bureau of water supply an application for water supply service before execution of the agreement with the tenant, the city's decision not to place the name of such tenant on the water bills but rather to deal with the landlord was not unreasonable and did not operate to discriminate against the tenant. The landlord's action was supported by other landlords in the city who sought the same relief. (Mockler-Florida)
W73-10298

CITY OF TEXARKANA V. TAYLOR (ACTION FOR DAMAGES CAUSED BY SEWAGE BACKUP).
490 S.W.2d 191 (Ct. Civ. App. Texas 1973).

Descriptors: *Texas, *Judicial decisions, *Local governments, *Sewage districts, Negligence, Legal aspects, Water law, Water policy, Accidents, Sewers, Governments, Municipal wastes, Sewage.
Identifiers: *Sovereign immunity, *Nuisance (Legal aspects).

Plaintiffs were owners of a residence and of an apartment house that were damaged when the defendant city's sanitary sewer system backed up. The plaintiffs contended that the defendant was negligent in the operation of a segment of the sewer system and the jury found for the plaintiffs. The appellate court reversed however, and held that a municipality was immune from liability for negligence in the performance of governmental functions, and that maintenance of a sanitary sewer system was clearly a governmental function. While it was recognized that governmental immunity did not apply to private nuisances, that doctrine was held merely to be a classification of a type of damage inflicted, and not a cause of damage as was negligence. Private nuisance therefore did not provide a grounds for plaintiffs recovery. (Glickman-Florida)
W73-10299

CAPT. SOMA BOAT LINE, INC. V. CITY OF WISCONSIN DELLS (PUBLIC RIGHT TO UNOBSTRUCTED NAVIGATION IN NAVIGABLE RIVER).

203 N.W.2d 369 (Wis. 1973).

Descriptors: *Wisconsin, *Legislation, *Public rights, *Navigable waters, *Navigation, Bridges, Judicial decisions, Legal aspects, Water law, Water policy, Recreation, Common law, Constitutional law, Local governments, Water rights.
Identifiers: *Obstruction to navigation, *Water rights (Non-riparians), Injunctive relief.

Plaintiff, a boat tourline owner sought to abate the maintenance of a bridge by the defendant city as a public nuisance. Plaintiff contended that the bridge was never authorized to be constructed or maintained by law and constituted an obstruction and hazard to the use of a navigable stream. The trial court granted defendant a motion for summary judgment and the Wisconsin Supreme Court affirmed the decision. The court held that the statute plaintiff sought to enforce applied to bridges constructed by individuals and not by cities. Further, the proper remedy under that statute against the maintenance of a bridge was a forfeiture of liquidated damages, and not abatement. The court went on to note that the state held in trust the public right to the unobstructed use of navigable waters for recreation and commercial use, but stated that the legislature could authorize municipalities to construct bridges, provided that the bridges maintained did not obstruct navigable waters. The judgment entered in this case did not preclude the plaintiff from pursuing any other available remedy. (Glickman-Florida)
W73-10300

DRAINAGE DISTRICTS, COMMISSION COMPOSITION AND POWERS.

Ark. Stat. Ann. secs. 21-505.1 thru 21-553 (Supp. 1971).

Descriptors: *Arkansas, *Legislation, *Drainage districts, *Drainage area, Levee districts, Governments, Federal government, State governments, Bond issues, Financing, Contracts, Legal aspects, Procurement, Bids, Performance, Administrative agencies, Governmental interrelations, Administrative decisions, Legal review.

The membership of the Drainage District Board of Commissioners for any drainage district may be increased from three to five by a majority vote of

the real property owners of the district. This can be accomplished by presenting a petition to the Court of the district signed by more than 50% of the real property owners. The number of commissioners may also be increased by order of the court having jurisdiction in the drainage district. The terms of office shall be 9 years for Commissioners in three-men districts and 10 years for those in five-men districts. The Board of Commissioners shall have control of the construction of improvements in their districts. They may advertise for contract bids. If the work is to be done in cooperation with the federal government, the federal agency involved shall let and carry out the contracts. All contractors shall be required to give bond to insure the performance of their contracts. The Board may borrow money and issue bonds to pay for the improvements. (Glickman-Florida)
W73-10301

REGIONAL WATER DISTRIBUTION DISTRICTS.
Ark. Stat. Ann. secs. 21-1407 thru 21-1408 (Supp. 1971).

Descriptors: *Arkansas, *Water district, *Districts (Water), *Administrative agencies, *Legislation, Governments, Local governments, Water law, Water policy, Financing, Bond issues, Budgeting, Capital, Loans, Interest, Financial feasibility, Economic efficiency, Water utilization, Water management (Applied), Project planning.

All powers granted a water district under this act shall be executed by a board of directors composed of three registered voters of that district. The directors shall be elected by the voters of the district as part of the General Election. Each district shall have power to borrow money and otherwise contract indebtedness, to issue its obligations therefor, and to secure the payment thereof by mortgage. The bonds must be issued by resolution of the board of directors. The directors may also fix, regulate and collect rates, fees, rents or other charges for water or any other facilities or services furnished by the water district. If any district distributes water to consumers outside of the district, their fees shall be calculated to pay the cost of such distribution. (Glickman-Florida)
W73-10302

WATER CONSERVATION COMMISSION.
Ark. Stat. Ann. secs. 21-1302 thru 21-1331 (Supp. 1971).

Descriptors: *Arkansas, *Legislation, *Dams, *Water conservation, Impoundments, Dam construction, Administrative agencies, Regulation, Legal aspects, Water management (Applied), Water policy, Water resources, Water resources development, Land resources, Land development, Natural resources, Bond issues, Legal review, Permits, Water utilization, Water allocation (Policy).
Identifiers: Administrative regulations.

The Water Conservation Commission (Commission) shall have the power to issue permits for the construction of dams to impound water on streams. Before any person shall have the right to construct or own a dam or impound water, he must obtain a permit from the Commission. Before the permit is granted, the Commission will hold a hearing to see if there are any objections to the issuance of the permit. However, any person owning land or having the right to possess land shall have the right to impound water on it without obtaining a permit. Any person affected by any rule or order made by the Commission may go to court to contest it. Any person diverting water from any stream, lake or pond must register with the Commission. The Soil and Water Conservation Commission has the duty of formulating and engaging in a comprehensive program for the development and management of the state's water and related land resources. The Commission may establish and maintain a fund to pay for any water development project. The Commission may also issue revenue bonds to finance projects. (Glickman-Florida)
W73-10303

WATER WELL CONSTRUCTION ACT.

Ark. Stat. Ann. sec. 21-2001 thru 21-2020 (Supp. 1971).

Descriptors: *Arkansas, *Public health, *Water wells, *Legislation, *Water supply development, Regulation, Water sources, Wells, Water supply, Water resources, Water management (Applied), Water law, Legal aspects, Water policy, Natural resources, Water yield improvement, Water utilization, Permits, Public benefits, Administrative agencies, Water resources development, Legal review.
Identifiers: *Licenses, *Administrative regulations, Emergency powers.

In that there is an increasing demand for water necessitating the construction of water wells, it is imperative that underground water supplies be developed in such a way as to protect the general health, safety and welfare while still providing sufficient potable water supplies. Because it is essential that those engaged in waterwell drilling cooperate with the state in such development, a Committee on Water Well Construction, (Committee), is established to oversee such cooperation. The Committee shall adopt rules and regulations governing the construction, repair and abandonment of water wells. The Committee is authorized to inspect and either approve or disapprove any abandoned or operative water well. All water well contractors shall be required to have a rig permit issued by the Committee before any rig shall be operated. Further, every person who wishes to engage in the business of water well contracting must obtain a license from the Committee to conduct such business. Procedural requirements for obtaining permits, licenses and for registration are set forth along with provisions dealing with the membership and administration of the Committee. Penalties for violation of this chapter are included. (Glickman-Florida)
W73-10304

ARKANSAS RIVER BASIN COMPACT.

Ark. Stat. Ann. sec. 21-2101 (Supp. 1971).

Descriptors: *Legislation, *Arkansas, *Oklahoma, *Water resources development, *Interstate compacts, Water yield, Administrative agencies, Water utilization, Watershed management, Watersheds (Basins), Water law, Legal aspect, Water policy, Water pollution abatement, Water resources, River basin development, Water allocation (Policy), Water management (Applied), Interstate commissions, Equitable apportionment, Regulation.
Identifiers: *Arkansas River.

Arkansas and Oklahoma have agreed on a compact respecting the waters of the Arkansas River and its tributaries. The compact's major purposes are to fairly apportion the waters of the Arkansas River between the two states and to promote its development; to provide an agency to apportion the water to be known as the Arkansas-Oklahoma Arkansas River Compact Commission (Commission); to encourage the maintenance of a pollution abatement program in the two states; and to facilitate cooperation of water administrative agencies in both states to develop and manage the water resources of the Arkansas River Basin. Each state may construct and maintain for its own needs water storage reservoirs in the state. The Commission shall have the power to adopt rules and regulations governing its operations and implementing this compact, as well as authority to enforce those rules. It shall also collect and analyze data on stream flows and water quality and continue research for developing means of effective pollution abatement and determining total basin yields. (Glickman-Florida)
W73-10305

NAVIGABLE WATERWAYS, RIVER CROSSING PROPRIETORSHIP.

Ark. Stat. Ann. secs. 73-2201 thru 73-2216 (Supp. 1971).

Descriptors: *Arkansas, *Legislation, *Navigable waters, *Bridge, Water law, Legal aspects, Water policy, Ownership of beds, Navigable rivers, Structures, Land tenure, Legal review, Jurisdiction, Administrative agencies, Judicial decisions.
Identifiers: *Navigable water crossing, Administrative regulations, Administrative hearings.

The Public Service Commission, (Commission), shall have jurisdiction over all navigable water crossings. It shall have the power to require that a crossing be constructed or operated in a manner consistent with public safety and that causes no interference with some paramount use of the Navigable Waterway. Any person who wants to operate a crossing must file a petition for approval with the Commission. The Commission shall then hold a hearing to determine if there are valid objections to the petition, and if there are none, shall grant it. Rights granted to the River Crossing Proprietor are perpetual. The applicant shall be required to pay all costs and expenses of a proceeding under this Act. Any party to this proceeding may file a petition in the Circuit Court to have the decision reviewed, and then appeal the final action from there to the Supreme Court of Arkansas. (Glickman-Florida)
W73-10306

CESSPOOLS, PRIVY WELLS AND DRAINAGE SYSTEMS.

Del. Code Ann. tit. 16, sec. 1506 (Supp. 1970).

Descriptors: *Delaware, *Cesspools, *Legislation, *Drainage systems, *Underground waste disposal, Sumps, Water control, Water management (Applied), Water sources, Legal aspects, Water law, Water policy, Administrative agencies, Public health, Drains, Water pollution control, Waste water disposal, Drainage wells, Waste water (Pollution), Sewage disposal.
Identifiers: Privy wells.

Before construction or alteration of cesspools, privy wells or drainage systems, the plans for these water supply systems shall be submitted to the Delaware Department of Natural Resources and Environmental Control for its approval. That Department shall not grant approval if the Department of Health and Social Services disapproves the plans within thirty days of their submission. (Glickman-Florida)
W73-10307

WATERCOURSES; DIVERSION, OBSTRUCTION, OR POLLUTION AS CONSTITUTING TRESPASS.

105 Ga. Code Ann. secs. 1407 thru 1410 (Supp. 1972).

Descriptors: *Georgia, *Watercourses (Legal aspects), *Legislation, *Trespass, Natural streams, Perennial streams, Non-navigable waters, Legal aspects, Water law, Water policy, Riparian rights, Right-of-Way, Water pollution, Diversion, Obstruction to flow, Reasonable use, Relative rights, Diversion structures, Groundwater, Base flow.

Identifiers: Natural flow doctrine.

The owner of land through which nonnavigable watercourses flow is entitled to have that water come to his land in its natural and usual flow subject only to such lessening as may be caused by a reasonable use of it by other riparian owners. Diverting the stream obstructing it so as to impede its course or cause it to overflow, or polluting it shall be a trespass on that landowner's property. Trespass may not be brought for any supposed interference with the rights of a proprietor of an underground stream because of the difficulties of ascertaining its course. However, the owner of realty owns title upward and downward indefinitely, and any unlawful interference with those rights gives him a cause of action. Unlawful interference with a right of way is a trespass against the party entitled to it. (Glickman-Florida)
W73-10308

WATER SUPPLY QUALITY CONTROL.

88Ga. Code Ann. secs. 2601 thru 2618 (Supp. 1972).

Descriptors: *Georgia, *Legislation, *Public health, *Water quality control, *Water supply, Legal aspects, Regulation, Water purification, Water pollution, Administrative agencies, Dependable supply, Water tanks, Water storage, Water supply development, Water sources, Water policy, Water law, Storage requirements, Water utilization, Water management (Applied), Water conservation, Water yield.
Identifiers: *Administrative regulations, Certification, Licenses.

The water supplies of Georgia shall be used to the maximum benefit of the people. The Board of Health, (Board), is designated to establish and maintain a water quality control program adequate for present and future needs. The Board shall have the duties to establish water quality standards, as well as policies and standards governing the purification, treatment and storage of water for public water supply systems. The Board has the power to enforce its policies, as well as authorize research to update and better its programs. No person shall operate any public water system without first securing approval from the Board of the source of the water supply, the treatment and storage methods, the specifications for construction of the facility and its operation. Members of the Board shall be permitted access at all reasonable times to any property for the purpose of investigating conditions related to the furnishing of water to the public. In the case of an emergency affecting public health, the Board may order action taken without notice or a hearing. It shall be a misdemeanor to violate the Board's rulings. (Glickman-Florida)
W73-10309

6G. Ecologic Impact of Water Development

SOME PROBLEMS IN THE CONSTRUCTION OF RESERVOIRS IN THE USSR (NEKOTORYYE PROBLEMY SOZDANIYA VODOKHRANILISHCH V SSSR),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
A. B. Avakyan.
Akademiya Nauk SSSR, Izvestiya, Seriya Geograficheskaya, No 4, p 56-63, July-August 1972. 10 ref.

Descriptors: *Reservoirs, *Reservoir construction, Reservoir operation, Environmental effects, Water users, Economics, Agriculture, Land use, Irrigation, Water supply, Flood control, Electric power, Fish management, Navigation, Regulation.
Identifiers: *USSR.

Arguments against the view that reservoirs are generally undesirable are based on the contention that the positive impact of manmade lakes has received less attention than the negative effects. The development of a set of principles is urged to guide future reservoir development. These principles would evaluate reservoirs as complex structures with both positive and negative impacts on the environment and on various sectors of the economy. Techniques are needed to predict these impacts and to calculate the overall economic effect. Expansion of reservoir-focused research will require the organization of permanent research stations and field expeditions at selected reservoirs in a variety of physical settings and the use of these reservoirs for experiments designed to test theoretically sound proposals and recommendations. (Josefson-USGS)
W73-09803

URBAN PLANNING AND DEVELOPMENT OF RIVER CITIES,
Vollmer Associates, New York.
A. H. Vollmer.
Journal of the Urban Planning and Development Division, American Society of Civil Engineers, Vol 96, No UP1, p 59-64, March 1970.

Descriptors: *Planning, *Urbanization, Recreation, Rivers, Land use, Water quality Aesthetics.
Identifiers: *Riverfront planning, *Riverfronts, Waterfronts.

A general discussion of the reasons cities have located on rivers and the evolution of their riverfront areas is presented. Cities have located on rivers largely for transportation and trade purposes and the waterfronts have been predominantly used for industrial and commercial activities. However, as our life style and economy have changed, many of these areas have become obsolete and deteriorating. With our present concern for the environment and demands for water-based recreation there arises significant conflicts over the use of the river and its riverfront land. Considerations of aesthetics and compatible functions must be key factors in future planning for urban waterfront areas. The main objective should be to meet the new demands for the urban river yet allow for order and meaning. (Elfers-North Carolina)
W73-09819

BARTOW MAINTENANCE DREDGING: AN ENVIRONMENTAL APPROACH,
For primary bibliographic entry see Field 05G.
W73-09881

THE SAVANNAH RIVER PLANT SITE,
Savannah River Ecology Lab., Aiken, S.C.
T. M. Langley, and W. L. Marter.
Available from NTIS, Springfield, Va., as Report No. DP-1323; $3 per copy, $0.95 microfiche. Report No. DP-1323, Jan. 1973. 175 p, 44 fig, 21 tab, 66 ref, 9 append.

Descriptors: *Sites, *South Carolina, *Savannah River, Laboratories, *Research facilities, Administrative agencies, Water supply, Geology, Hydrology, Meteorology, Biology, Ecology, Streams, Surface waters, Groundwater, Animal groupings, Plant groupings, Earthquakes, Atlantic Ocean.
Identifiers: *Savannah River Plant (AEC).

On June 20, 1972, the Atomic Energy Commission designated nearly 200,000 acres of land near Aiken, South Carolina, as the nation's first National Environmental Research Park. The designated land surrounds the AEC Savannah River Plant production complex. The site, which borders the Savannah River for 22 miles, includes swampland, pine forests, abandoned town sites, a large man-made lake for cooling water impoundment, fields, streams, and watersheds. The geological, hydrological, meteorological, and biological characteristics of the Savannah River Plant site are described. Discussed in detail are the streams, ground and surface water, climatology (including hurricanes), earthquakes, soil, forests, and wildlife. (Houser-ORNL)
W73-10167

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF SALEM NUCLEAR GENERATING STATION UNITS 1 AND 2.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10177

FINAL ENVIRONMENTAL STATEMENT RELATED TO OPERATION OF PEACH BOTTOM ATOMIC POWER STATION UNITS 2 AND 3.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10178

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED SAN ONOFRE NUCLEAR GENERATING STATION - UNITS 2 AND 3.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10179

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONTINUATION OF CONSTRUCTION AND OPERATION OF UNITS 1 AND 2 AND CONSTRUCTION OF UNITS 3 AND 4 OF NORTH ANNA POWER STATION.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-10205

SIMON RUN WATERSHED PROJECT, POTTAWATTAMIE COUNTY, IOWA (FINAL ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Des Moines, Iowa.
For primary bibliographic entry see Field 04D.
W73-10263

RESTORATION OF HISTORIC LOW FLOW DIVERSION TO ARROYO COLORADO; LOWER RIO GRANDE FLOOD CONTROL PROJECT, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Dallas, Tex. Southwestern Div.
For primary bibliographic entry see Field 04A.
W73-10264

DREDGING AND FILLING, COWIKEE STATE PARK, LAKEPOINT RESORT, WALTER F. GEORGE LAKE, CHATTAHOOCHEE RIVER, ALABAMA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 04A.
W73-10265

CONTROL OF EURASIAN WATERMILFOIL (MYRIOPHYLLUM SPICATUM L.) IN TVA RESERVOIRS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 04A.
W73-10266

THIRD ANNUAL REPORT OF THE COUNCIL ON ENVIRONMENTAL QUALITY.
For primary bibliographic entry see Field 06E.
W73-10272

ALLISON V. FROEHLKE (CHALLENGE TO ENVIRONMENTAL IMPACT STATEMENT OF RESERVOIR PROJECT).
For primary bibliographic entry see Field 06E.
W73-10292

07. RESOURCES DATA

7A. Network Design

SUMMARY OF PLANS FOR AQUISITION OF WATER DATA BY FEDERAL AGENCIES, FISCAL YEAR 1974.
Geological Survey, Washington, D.C.

Office of Water Data Coordination Report, February 1973. 20 p, 2 fig, 4 tab, 3 append.

Descriptors: *Basic data collections, *Water resources, *Water yield, *Water quality, *United States, Reviews, Planning, Gaging stations, Flow measurement, Surface waters, Groundwater, Chemical analysis, Sampling, Sites, Projects, Costs.
Identifiers: *Data aquisition plans (FY 1974).

This digest presents plans for water data acquisition during fiscal year 1974 for each of the 21 federal water resources regions. Included also is information regarding budgetary status and activities of national scope as reported by officials at headquarters level. Plans for the operation of long term stations to obtain surface water quantity and quality and groundwater quality data are summarized in tables. For each data category the table lists the number of stations operated by federal agencies on January 1, 1972, the number planned by federal agencies for activation or discontinuance, and the number that would be in operation by June 1974. Individual agency plans for activation or discontinuance of stations are shown. Many of the stations reported by the Geological Survey represent the combined needs of several agencies both federal and nonfederal. The tables are compiled from information supplied by the agencies and incorporated in the regional plans. (Woodard-USGS)
W73-09798

ESTIMATION THEORY APPLICATIONS TO DESIGN OF WATER QUALITY MONITORING SYSTEMS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-09837

EXPECTED NUMBER AND MAGNITUDES OF STREAM NETWORKS IN RANDOM DRAINAGE PATTERNS,
California Univ., Irvine.
For primary bibliographic entry see Field 04A.
W73-10335

7B. Data Acquisition

EVALUATION OF NORTH WATER SPRING ICE COVER FROM SATELLITE PHOTOGRAPHS,
McGill Univ., Montreal (Quebec). Dept. of Meteorology.
For primary bibliographic entry see Field 02C.
W73-09800

SHORT-RANGE FORECAST OF MAXIMUM FLOOD DISCHARGES ON THE KYZYLSU RIVER AND ITS TRIBUTARIES (KARATKOSROCHNYY PROGNOZ MAKSIMAL'NYKH RASKHODOV PAVODKOV NA R. KYZYLSU I YEYE PRITOKAKH),
For primary bibliographic entry see Field 04A.
W73-09809

A SYSTEM FOR REMOTE TELEMETRY OF WATER QUALITY DATA,
Maine Univ., Orono. Dept. of Electrical Engineering.
W. E. Daniels, and W. W. Turner.
In: Water Quality Instrumentation, Vol 1; Selected Papers from International Symposia presented by Instrument Society of America: Pittsburgh, Penn, Instrument Society of America, p 166-175, 1972. 9 fig, 2 ref. OWRR B-003-ME (5), Me R 1088-12 and Me R 1094-12.

Descriptors: *Water quality, *Instrumentation, *Telemetry, *Monitoring, Sampling, Data collections, Water analysis, Water pollution, Dissolved oxygen, Water temperature, Salinity.

An instrumentation system capable of measuring dissolved oxygen, temperature, and salinity at a remote location and transmitting this information to a central computer center can be modified for use in either fresh or ocean water or in measuring other parameters. All the measuring equipment is in a 10-foot decked boat anchored at the desired site. Water is pumped from the various depths in sequence, and all measurements for a particular depth are made simultaneously at the surface by appropriate sensors. The sensor outputs are used to modulate an audio frequency tone associated with each parameter. In addition the frequency of another audio tone is changed each time the pump changes to a new depth. These tones are summed and the composite signal frequency modulates a radio transmitter. The radio signal is received by a shore station and demodulated, and the regained composite audio signal is sent by leased telephone line to the computer center. The audio signal is then filtered to produce separate audio frequencies. These frequencies are demodulated and the resulting d-c signals are sent to a computer through appropriate converters. (Knapp-USGS)
W73-09946

THE METHODS OF EXPLORATION OF KARST UNDERGROUND WATER FLOWS IN POPOVO POLJE, YUGOSLAVIA,
Trebisnica Hydrosystem, Trebinje (Yugoslavia).
For primary bibliographic entry see Field 02F.
W73-09953

BASIC STUDIES IN HYDROLOGY AND C-14 AND H-3 MEASUREMENTS,
Niedersaechsisches Landesamt fuer Bodenforschung, Hanover (West Germany).
For primary bibliographic entry see Field 02F.
W73-09966

MICROWAVE RADIOMETRIC INVESTIGATIONS OF SNOWPACKS--FINAL REPORT,
Aerojet-General Corp., El Monte, Calif. Microwave Div.
For primary bibliographic entry see Field 02C.
W73-09995

DISTRIBUTION OF THE PHYTOPHYLLIC INVERTEBRATES AND METHODS OF THEIR QUANTITATIVE EVALUATION. (1), (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Instytut Hidrobiologii.
For primary bibliographic entry see Field 02I.
W73-10007

SEA ICE OBSERVATION BY MEANS OF SATELLITE,
Alaska Univ., College. Geophysical Inst.
G.Wendler.
Journal of Geophysical Research, Vol 78, No 9, p 1427-1448, March 20, 1973. 8 fig, 1 tab, 32 ref.

Descriptors: *Sea ice, *Remote sensing, *Mapping, Albedo, Surveys, Satellites (Artificial), Arctic, Alaska, Aerial photography.

Ice conditions were examined in detail by satellite imagery in a small area (about 120 km X 150 km) of the Arctic Ocean off the shore of north Alaska. Brightness was distinguished by computer for each data point. To suppress the transient cloudiness, minimum brightness composites were used. The ice conditions could be mapped in great detail for 5-day periods for the summer of 1969. The ice conditions depend strongly on the wind direction. Offshore wind moved the ice out, and wind toward the shore brought it back. A good correlation was found with data taken from the weather maps, although the data from a ground-based climatological station were not always in good agreement with the ice movement. Comparison with ice charts mapped by more conventional methods showed good agreement in most cases. The satellite picture, however, gave much greater detail. Monthly mean albedo maps were constructed from the brightness composites for the 4 months from mid-May to mid-September. (Knapp-USGS)
W73-10044

USE OF INFRARED AERIAL PHOTOGRAPHY IN IDENTIFYING AREAS WITH EXCESS MOISTURE AND GROUNDWATER OUTFLOW (OB ISPOL'ZOVANII INFRAKRASNOY AEROS 'YEMKI PRI VYYAVLENII UCHASTKOV IZBYTOCHNOGO UVLAZHNENIYA I VYKHODOV PODZEMNYKH VOD),
Nauchno-Issledovatelskii Institut Geologii Arktiki, Leningrad (USSR).
B. V. Shilin, N. A. Gusev, and Ye Ya Karizhenskiy.
Sovetskaya Geologiya, No 1, p 155-160, January 1971. 7 fig, 8 ref.

Descriptors: *Aerial photography, *Infrared radiation, *Excess water (Soils), *Discharge (Water), *Groundwater, Hydrogeology, Soil moisture, Moisture content, Analytical techniques.
Identifiers: *USSR.

Examples are given of diverse natural and technical conditions for the use of infrared aerial photography in hydrogeological investigations. Refinements in techniques stem from the need to determine optimal conditions for the application of infrared photography to hydrogeology in different geological regions and climatic zones. Application of the techniques is especially important in locating groundwater in desert and semidesert zones. (Josefson-USGS)
W73-10054

TRACER RELATIONS IN MIXED LAKES IN NON-STEADY STATE,
Weizmann Inst. of Science, Rehovot (Israel). Isotope Dept.
For primary bibliographic entry see Field 02H.
W73-10059

AERIAL EXPERIMENTS OF RADIOMETRIC DETECTION OF HYDROCARBON DEPOSITS IN THE SEA, (EXPERIENCES AERIENNES DE DETECTION RADIOMETRIQUE DE NAPPES D'HYDROCARBURES EN MER).
For primary bibliographic entry see Field 05A.
W73-10148

USE OF TRITIATED WATER FOR DETERMINATION OF PLANT TRANSPIRATION AND BIOMASS UNDER FIELD CONDITIONS,
Argonne National Lab., Ill.

For primary bibliographic entry see Field 02D.
W73-10190

STUDY ON THE SENSITIVITY OF SOIL MOISTURE MEASUREMENTS USING RADIATION TECHNIQUES, NYLON RESISTANCE UNITS AND A PRECISE LYSIMETER SYSTEM,
Ghent Rijksuniversiteit (Belgium). Dept. of Agricultural Science.
For primary bibliographic entry see Field 02G.
W73-10194

MONITORING THE WATER UTILIZATION EFFICIENCY OF VARIOUS IRRIGATED AND NON-IRRIGATED CROPS, USING NEUTRON MOISTURE PROBES (CONTROLE DE L'UTILISATION ET DE L'EFFICIENCE DE L'EAU CHEZ DIVERSES CULTURES IRRIGUEES OU NON, AU MOYEN D'HUMIDIMETRES A NEUTRONS),
For primary bibliographic entry see Field 03F.
W73-10195

OPTIMISATION OF SAMPLING FOR DETERMINING WATER BALANCES IN LAND UNDER CROPS BY MEANS OF NEUTRON MOISTURE METERS (OPTIMISATION DE L'ECHANTILLONNAGE POUR DETERMINER LES BILANS HYDRIQUES SOUS CULTURE AU MOYEN DE L'HUMIDIMETRE A NEUTRONS),
Institut Technique des Cereales et Fourrages, Paris (France).
For primary bibliographic entry see Field 03F.
W73-10196

GROUND MOISTURE MEASUREMENT IN AGRICULTURE (BODENFEUCHTEMESSUNG IN DER LANDWIRTSCHAFT),
European Atomic Energy Community, Brussels (Belgium). Bureau Eurisotop.
For primary bibliographic entry see Field 03F.
W73-10209

MATHEMATICAL MODELING OF SOIL TEMPERATURE,
Arizona Univ., Tucson. Office of Arid-Lands Research.
For primary bibliographic entry see Field 02G.
W73-10213

A STUDY OF THE COST EFFECTIVENESS OF REMOTE SENSING SYSTEMS FOR OCEAN SLICK DETECTION AND CLASSIFICATION,
New Hampshire Univ., Durham. Dept. of Electrical Engineering.
For primary bibliographic entry see Field 05A.
W73-10228

7C. Evaluation, Processing and Publication

TRANSMISSION INTERCHANGE CAPABILITY--ANALYSIS BY COMPUTER,
Commonwealth Edison Co., Chicago, Ill.
For primary bibliographic entry see Field 08C.
W73-09764

THE DIGITAL PHOTO MAP,
Soft Ware Oriental Co. Ltd., Tokyo (Japan).
R. Kamiya.
Photogramm Eng., Vol 38, No 10, p 985-988, Oct 1972. 2 fig.

Descriptors: *Topographic mapping, *Photogrammetry, *Mapping, Design data, Contours, Maps, Topography, Terrain analysis, Photography, Aerial photography, Data processing.
Identifiers: *Photomaps, Data preparation, Automatic plotters, Computer-aided design, Stereoscopic map plotters, Analog to digital converters, Photographic analysis.

Use of a new type of photographic map--a digital photo map--is proposed instead of a topographic contour map for preparing layout designs. This proposal allows designers to use original photographs with essential digital information, eliminating the need for contour maps. In stereoscopic observation of a digital photo map, a stereoscopic model of the terrain and a grid mesh in 3 dimensions closely following the terrain surface can be seen. The ground elevations are indicated digitally at each grid point. The designer can draw a freehand design on the photographs under stereoscopic observation, and the digital figures required can be easily obtained from terrain data stored in the computer. The major operations required in making a digital photo map are very simple and almost automatic, requiring very little operator skill. A flow diagram showing principal operations in making a digital photo map is included. (USBR)
W73-09767

LOW-FLOW CHARACTERISTICS OF STREAMS IN THE PACIFIC SLOPE BASINS AND LOWER COLUMBIA RIVER BASIN, WASHINGTON,
Geological Survey, Tacoma, Wash.
For primary bibliographic entry see Field 02E.
W73-09786

STREAM CATALOG--PUGET SOUND AND CHEHALIS REGION,
Washington State Dept. of Fisheries, Olympia.
R. W. Williams, R. M. Laramie, and J. J. Ames.
Available from NTIS, Springfield, Va. 22151 COM-72-11326; Price $3.00 printed copy; $0.95 microfiche. Annual Progress Report March 1972. 71 p. NOAA 14-17-0001-2156.

Descriptors: *Fisheries, *Salmon, *Streams, *Washington, *Habitats, Water quality, Tributaries, Indexing, Data collections, Mapping, Hydrologic data, River basins, Physical properties, Land use, Water utilization, Spawning, Environmental effects, Ecology.
Identifiers: *Stream Catalog, *Puget Sound (Wash), *Chehalis Region (Wash).

A Stream Catalog of the Puget Sound and Chehalis Basins, Washington, has been compiled in a rough draft form by the Aquatic Environmental Management Section of the Washington Department of Fisheries. This catalog brings together all available physical descriptions and data concerning the individual rivers, tributary streams, and adjacent lands, as well as present status data through 1970, associated with the various salmon species and stream habitat utilization by each species. This interrelationship of stream physical conditions and present status of fish populations for each watershed is information vitally needed for sound management of these natural resources to insure perpetuation under the heavy demands projected beyond 1980. A numbering system for all Puget Sound rivers and streams was developed as an outgrowth of the needs of this catalog. This system also provides a highly useful code index adaptable for IBM identification. All federal, state, county and local water management agencies will have specific needs for this compilation of data in future planning. (Woodard-USGS)
W73-09787

GROUND-WATER FAVORABILITY AND SURFICIAL GEOLOGY OF THE LOWER AROOSTOOK RIVER BASIN, MAINE,
Geological Survey, Washington, D.C.
G. C. Prescott, Jr.
For sale by Geological Survey, price $0.75, Washington, D.C. 20243. Hydrologic Investigation Atlas HA-443, 1972. 1 sheet, 9 fig, 9 ref.

Descriptors: *Groundwater resources, *Aquifers, *Water yield, *Water quality, *Maine, Water wells, Test wells, Pumping, Hydrogeology, Aquifer characteristics, Mapping, Hydrologic data, Chemical analysis, Water temperature, Water levels, Precipitation (Atmospheric), Water supply, Water resources development.
Identifiers: *Lower Aroostook River basin (Maine).

The lower Aroostook River basin includes 536 square miles in northeastern Aroostook County in northern Maine. Included in the area are the cities of Caribou and Preque Isle and part or all of the following towns: Castle Hill, Caswell, Chapman, Connor, Easton, Fort Fairfield, Limestone, Mapleton, New Sweden, Perham, Stockholm, Wade, Washburn, Westmanland, and Woodland. Loring Air Force Base, the largest Strategic Air Command base in the East is in Limestone. This one-sheet atlas shows the depth of 453 bedrock wells and the yield of 317 of these wells. The percentage of wells, according to depth and yield, is shown in graphs, and yield and depth data for the principal aquifers are tabulated. The Carys Mills Formation is the source of water to more than 60% of the wells for which information is available. Of 27 wells capable of producing 100 gpm or more, 24 derived water from the Carys Mills. The quality of the groundwater is generally good, but the water is in the hard to very hard range. The temperatures of 68 samples of groundwater ranged from 4 to 14 deg C and averages 7 deg C. (Woodard-USGS)
W73-09801

REPLICATION MODELING FOR WATER-DISTRIBUTION CONTROL,
General Electric Co., Philadelphia, Pa. Re-entry and Environmental Systems Div.
For primary bibliographic entry see Field 04A.
W73-09833

COMPUTER LANGUAGES FOR ENGINEERS,
New Mexico State Univ., University Park. Dept. of Chemical Engineering.
For primary bibliographic entry see Field 05G.
W73-09834

AN INVESTIGATION INTO THE LONGTERM PERSISTENCE OF U. S. HYDROLOGIC RECORDS,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 04A.
W73-09869

COMPUTER SIMULATION OF GROUND WATER AQUIFERS OF THE COASTAL PLAIN OF NORTH CAROLINA,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 02F.
W73-09871

DESIGN OF A WORLD MONITORING SYSTEM,
Ministry of Agriculture, Fisheries and Food, Lowestoft (England). Fisheries Lab.
For primary bibliographic entry see Field 05A.
W73-09924

ESTIMATING THE YIELD OF THE UPPER CARBONATE AQUIFER IN THE METROPOLITAN WINNIPEG AREA BY MEANS OF A DIGITAL MODEL,
For primary bibliographic entry see Field 02F.
W73-09950

REGIONALIZATION OF HYDROGEOLOGIC PARAMETERS FOR USE IN MATHEMATICAL MODELS OF GROUNDWATER FLOW,
IBM Watson Research Center, Yorktown Heights, N.Y.
For primary bibliographic entry see Field 02F.
W73-09961

SAMPLING, HANDLING AND COMPUTER PROCESSING OF MICROMETEOROLOGICAL DATA FOR THE STUDY OF CROP ECOSYSTEMS,
I. Impens, and R. Lemeur.
Meded Fac Landbouwwet Rijksuniv Gent, Vol 36, No 4, p 1395-1418, 1971, Illus.
Identifiers: Computer programs, Crop, Ecosystems, *Meteorological data, *Data processing, *Sampling, Data processing.

Most ecological studies require simultaneous measurement of a large number of parameters, particularly in third level experiments and measurements of primary production. The sequence of apparatus that might be used in such experiments is described with reference to plant growth. These would include a 'sensing' and 'sampling' unit for radiation temperature, moisture and CO2 measurements. All micrometeorological parameters were measured with a 'Hewlet-Packard acquisition system' which records the data. A homemade 'control unit' is illustrated by a schematic drawing to provide the 'data handling equipment.'--Copyright 1972, Biological Abstracts, Inc.
W73-10001

ECOLOGY OF A EUTROPHIC ENVIRONMENT: MATHEMATICAL ANALYSIS OF DATA, (IN FRENCH),
Centre Universitaire de Luminy, Marseille (France). Laboratoire d'Hydrobiologie Marine.
For primary bibliographic entry see Field 05C.
W73-10011

HYDRO-POWER SYSTEM SIMULATION TECHNIQUE,
Corps of Engineers, Portland, Oreg. North Pacific Div.
For primary bibliographic entry see Field 04A.
W73-10019

A MARKOV MODEL FOR BEACH PROFILE CHANGES,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
For primary bibliographic entry see Field 02J.
W73-10043

A REVIEW OF SOME MATHEMATICAL MODELS USED IN HYDROLOGY, WITH OBSERVATIONS ON THEIR CALIBRATION AND USE,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02A.
W73-10061

APPENDIX TO HEALTH AND SAFETY LABORATORY FALLOUT PROGRAMS - QUARTERLY SUMMARY REPORT. (DEC. 1, 1972 THROUGH MARCH 1, 1973),
New York Operations Office (AEC), N.Y. Health and Safety Lab.
For primary bibliographic entry see Field 05B.
W73-10176

DIFFUSION IN COMPLEX SYSTEMS,
UT-AEC Agricultural Research Lab., Oak Ridge, Tenn.
For primary bibliographic entry see Field 02K.
W73-10183

TIME PERIODS AND PARAMETERS IN MATHEMATICAL PROGRAMMING FOR RIVER BASINS,
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
For primary bibliographic entry see Field 04A.
W73-10317

REGIONAL ANALYSES OF STREAMFLOW CHARACTERISTICS,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 02E.
W73-10323

AQUIFER SIMULATION MODEL FOR USE ON DISK SUPPORTED SMALL COMPUTER SYSTEMS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 02F.
W73-10328

08. ENGINEERING WORKS

8A. Structures

SEISMIC RISK AND DESIGN RESPONSE SPECTRA,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 08G.
W73-09761

SOME PROBLEMS IN THE CONSTRUCTION OF RESERVOIRS IN THE USSR (NEKOTORYYE PROBLEMY SOZDANIYA VODOKHRANILISHCH V SSSR),
Akademiya Nauk SSSR, Moscow. Institut Vodnykh Problem.
For primary bibliographic entry see Field 06G.
W73-09803

AN APPROACH TO ANALYSIS OF ARCH DAMS IN WIDE VALLEYS,
Southampton Univ. (England). Dept. of Civil Engineering.
J. R. Rydzewski, and R. W. Humphries.
Journal of the Power Division, American Society of Civil Engineers, Vol 99, No PO1, Proceedings paper No 9710, p 165-174, May 1973. 8 fig, 4 tab, 9 ref.

Descriptors: *Arch dams, *Embankments, *Stress analysis, *Design, *Water resources, *Computer programs, *Finite element analysis, River flow, Spillways, Valleys, Foundations, Rock fill, Costs, Mathematical models, Systems analysis, Flood plains.
Identifiers: *South Africa, Artificial abutments.

The use of arch dams in combination with earth or rock fill embankments for wide valley sites has arisen from the need to provide adequate spillway capacity on certain rivers in southern Africa. The stress analysis of the resulting structure, consisting of an arch dam with artificial abutments can be achieved by means of finite element techniques. However, cost factors would tend to discourage their use during preliminary stages of the design process. This paper investigates the behavior of several arch dam shapes in wide valleys of different elastic properties and then proceeds to suggest a way in which the Southampton University Arch Dam (SUAD) computer program, based on thinshell approximation of the arch dam, can be extended to cover this type of problem. A comparison with a finite element solution indicates that the SUAD program can be used with confidence for preliminary design studies of arch dams with artificial abutments. Once the final shape of the dam and abutments has been obtained, the total structure should be checked using finite element methods. (Bell-Cornell)
W73-09841

COOLING PONDS - A SURVEY OF THE STATE OF THE ART,
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05D.
W73-09849

HELLER DISCUSSES HYBRID WET/DRY COOLING,
Eotvos Lorand Univ., Budapest (Hungary).
For primary bibliographic entry see Field 05D.
W73-09855

CONTROL OF THE OPERATING REGIMES OF WATER RESOURCES SYSTEMS,
For primary bibliographic entry see Field 04A.
W73-09868

LOCAL SCOUR UNDER OCEAN OUTFALL PIPELINES,
Montgomery (James M.), Inc., Pasadena, Calif.
J. L. Chao, and P. V. Hennessy.
Journal Water Pollution Control Federation, Vol 44, No 7, p 1443-1447, July 1972. 4 fig, 18 ref.

Descriptors: *Waste water disposal, *Outlets, *Pipelines, *Scour, *Currents (Water), Flow, Velocity, Shear stress, Sediments, Particle size, Analytical techniques.

An analytical method is derived for estimating the maximum depth of scour caused by a subsurface current under an ocean outfall pipeline. From the potential and stream functions governing the flow, the velocity in the scour hole and the discharge through the hole per unit length of pipe can be computed. The maximum boundary shear stress can be calculated from the velocity; and the maximum scour depth, by matching boundary shear stress with critical tractive stress of the sand grain size composing the ocean floor. The method provides an order-of-magnitude evaluation of hole depth for analysis of the pipeline's structural stability. (Ensign-PAI)
W73-09902

ENGINEERING COMMITTEE ON OCEANIC RESOURCES PROCEEDINGS OF THE FIRST GENERAL ASSEMBLY.
For primary bibliographic entry see Field 06E.
W73-09914

MOVABLE DAM AND METHOD OF OPERATION,
J. Aubert.
US Patent No 3,718,002, 5 p, 21 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 907, No 4, p 897, February 27, 1973.

Descriptors: *Patents, *Dams, *Engineering structures, Movalbe dams, *Floodgates, Flood control, River regulation, Water control, Surface waters.

A movable dam is discussed which is intended to be built across waterways of different types for the purpose of regulating the water level at predetermined locations upstream of the structure. The dam has a fixed portion which is anchored in the bed of the watercourse and a movable gate system for regulating the cross-sectional area provided for the flow of water through the dam. It differs from others by having at least one closure element which can be regulated under a heavy load and another which can be operated only 'in the dry' or under a so-called light load. (Sinha-OEIS)
W73-09938

RIVER THAMES--REMOVABLE FLOOD BARRIERS,
Bruce White, Wolfe Barry and Partners, London (England).
A. H. Beckett.
Royal Society of London Philosophical Transactions, Mathematical and Physical Sciences, Vol 272, No 1221, p 259-274, May 4, 1972. 16 fig.

Descriptors: *Barriers, *Surges, *Wind tides, *Estuaries, *Gates, *Navigation, Cost-benefit analysis, Flood control, Floodgates.
Identifiers: *Thames estuary (England).

A removable flood barrier in Long Reach of the Thames is the basis of a flood defense system compatible with the navigation interests, yet avoiding the high cost of bank raising in the metropolis. Three barrier designs were developed, each embodying two 150-m-wide navigation openings. The lesser use by shipping of reaches above the Royal Docks permitted narrower openings. Schemes for some six different sites and over 40 variations in span arrangement were investigated and led to a proposal for four 60-m navigation openings in Woolwich Reach which might be closed by a form of rising section gate. This has proved to be the cheapest, most reliable, and quickest to install of all the schemes investigated and is now the basis of design for contract. (Knapp-USGS)
W73-09996

SILTATION PROBLEMS IN RELATION TO THE THAMES BARRIER,
Hydraulics Research Station, Wallingford (England).
M. P. Kendrick.
Royal Society of London Philosophical Transactions, Mathematical and Physical Sciences, Vol 272, No 1221, p 223-243, May 4, 1972. 21 fig, 1 tab, 5 ref.

Descriptors: *Silting, *Estuaries, *Barriers, *Flood control, Hydraulic models, Floodgates, Mathematical models, Tides, Wind tides, Surges, Sedimentation, Sediment transport, Bed load, Suspended load, Silts, Sands.
Identifiers: *Thames estuary (England).

A well-designed storm-surge barrier in the Thames used only to exclude surges should produce no insuperable siltation problems. Both mathematical and physical model results show that continuous tide control leads to increased siltation, the zone of greatest deposition depending on the barrier site. Methods adopted in tackling the problem include four large-scale estuarine surveys; the establishment of stations for continuously monitoring the suspended solids content of the river; field and laboratory tests to determine the properties of Thames silt; the development of a mathematical model to study the effect of the tide control on the distribution of silt which is in the navigation channel likely to follow barrier construction and continuous half-tide control. Current velocity, suspended silt concentration, salinity, and temperature at different depths along the estuary change throughout a spring and a neap tide during both high and low river flows. (Knapp-USGS)
W73-09997

POLLUTION PROBLEMS IN RELATION TO THE THAMES BARRIER,
Water Pollution Research Lab., Stevenage (England).
M. J. Barrett, and B. M. Mollowney.
Royal Society of London Philosophical Transactions, Mathematical and Physical Sciences, Vol 272, No 1221, p 213-221, May 4, 1972. 10 fig, 5 ref.

Descriptors: *Path of pollutants, *Estuaries, *Tidal streams, *Barriers, Flow control, Water level fluctuations, Streamflow, Tides, Water pollution control, Mathematical models, Hydraulic models, Surges, Wind tides, Saline water intrusion, Floodgates.
Identifiers: *Thames estuary (England).

Although the storm-surge barrier on the Thames, which is to be constructed about 15 km seaward of London Bridge, need only be closed to exclude exceptionally high tides to fulfill its primary function as a flood-prevention device, it could also be operated as a tide-control structure. A theoretical study to assess the effect of operating the barrier on the Thames estuary on a regular basis to prevent water levels from falling below a fixed datum is outlined. Studies on a large-scale physical model indicate that tide control would bring about fundamental changes in the estuary. The tidal range would be reduced, and current velocities would fall to almost zero. There would be a consequent reduction in tidal range and hence, in the tidal excursion. There would also be changes in salinity. The upstream limit of the saltwater would be displaced some 4 km farther seaward. When tide control was discontinued the original salinity distribution would quickly be reestablished. A one-dimensional, time-dependent numerical model, which encompasses the ebb and flow of the tide, was also developed. (Knapp-USGS)
W73-09998

NAVIGATION ON THE THAMES,
Port of London Authority (England).
G. R. Rees, and P. F. C. Satow.
Royal Society of London Philosophical Transactions, Mathematical and Physical Sciences, Vol 272, No 1221, p 201-212, May 4, 1972. 4 fig.

Descriptors: *Surges, *Wind tides, *Estuaries, *Barriers, *Flood control, Floods, Flood protection, Gates, Storms, Seiches, Tides, Navigation, Floodgates.
Identifiers: *Thames estuary (England).

Navigation on the Thames will be affected by the size of the opening of the storm-tide barrier. Shipping needs the widest possible channel, and any constriction should be as far upriver as practicable. During construction, special arrangements for navigation will be required to ensure the minimum of disruption to traffic. The closure of the barrier will halt all vessels bound through it and is likely to delay them for up to 12 hours. It will also have some effect on vessels bound for docks below the barrier. Special arrangements will be required to enable all such vessels to wait. Acceptance of the Woolwich site was governed by the forecast of the likely rate of closures to be initially no more than 2 per year. With opening widths of 61 m, a long straight approach is needed for navigation, and the piers of the barrier must be aligned to the direction of the tidal stream. To minimize disruption of navigation, the level of the sill must be low enough to ensure that vessels are not hindered. Sill level also needs to be considered in relation to the regime of the river. Use of the barrier other than for flood control could create problems of siltation and pollution, and it is essential before using the barrier for other than its prime purpose to establish that there is no such possibility. (Knapp-USGS)
W73-09999

CURRENT PROPOSALS FOR THE THAMES BARRIER AND THE ORGANIZATION OF THE INVESTIGATIONS,
Department of Public Health Engineering, London (England).
R. W. Horner.
Royal Society of London Philosophical Transactions, Mathematical and Physical Sciences, Vol 272, No 1221, p 179-185, May 4, 1972. 5 fig, 5 ref.

Descriptors: *Surges, *Wind tides, *Estuaries, *Barriers, *Flood control, Floods, Flood protection, Gates, Storms, Seiches, Tides, Navigation, Floodgates.
Identifiers: *Thames estuary (England).

A considerable area of London close to the River Thames floods when the water in the river reaches an exceptionally high level. The very high waters, due to exceptional meteorological conditions, are steadily increasing in level. The possible ways of meeting this threat are by raising the existing flood defenses, by constructing a barrage across the mouth of the estuary, or by constructing a removable flood barrier to be closed only when a dangerous surge tide is liable to occur. A site in Woolwich Reach was chosen for a flood barrier with four main openings of 61 m. The rising sector gate will be used for the main openings. (Knapp-USGS)
W73-10000

THE REGIONAL SETTING,
Institute of Geological Sciences, London (England).
K. C. Dunham.
Royal Society of London Philosophical Transactions, Mathematical and Physical Sciences, Vol 272, No 1221, p 81-86, May 4, 1972. 2 fig, 20 ref.

Descriptors: *Subsidence, *Sea level, Pleistocene epoch, Floods, Silting, Submergence.
Identifiers: *England.

Post-Pleistocene subsidence is still apparently continuing in the Thames Estuary and London. Holocene times have been a period of subsidence of the land relative to sea level, the total extent being over 20 m. The current rate of subsidence is about 100 mm per century. In areas like the Thames Estuary, the activities of man have undoubtedly affected the situation. (Knapp-USGS)
W73-10002

ACTIVITIES OF THE CORPS OF ENGINEERS IN MARINE POLLUTION CONTROL,
Corps of Engineers, Atlanta, Ga. South Atlantic Div.
For primary bibliographic entry see Field 05G.
W73-10103

SOLAR ENERGY AT OSC, (OPTICAL SCIENCES CENTER).
Arizona Univ., Tucson. Optical Sciences Center.

Optical Sciences Center Newsletter, Vol 6, No 3, p 65-67, December 1972. 4 photos.

Descriptors: *Solar radiation, *Heat transfer, *Thermal conductivity, *Design data, Arizona, Prototype tests, Research and development, Power system operation, *Energy conversion, Energy loss, Energy transfer, Energy budget, Model studies.
Identifiers: *Solar energy collector.

The first thermal test bed model of a solar energy collector on display at the University of Arizona's Optical Sciences Center demonstrates at full scale all essential features of the collector system as designed by A. B. and Marjorie P. Meinel. The model was built by Helio Associates, Inc., and funded through four western utility companies. Its purpose is to establish through experimentation that the concept will work as predicted, and to use it to obtain baseline engineering data on the collecting and heat transfer subsystems. Two basic types of data will be derived from the measurements, a dynamic analysis or determination of heating and cooling rates, and heat transfer characteristics whereby gas transfer and absorber temperatures are determined as a function of the flow rate, pressure, etc. It is hoped that a 10 megawatt experimental solar power farm can be operational near Yuma, Arizona, by 1976. For long-range plans, see W73-10216. (Paylore-Arizona)
W73-10215

A HARVEST OF SOLAR ENERGY,
Arizona Univ., Tucson. Optical Sciences Center.
A. B. Meinel, and M. P. Meinel.
Optical Sciences Center Newsletter, Vol 6, No 3, p 68-75, December 1972. 13 fig.

Descriptors: *Solar radiation, *Heat transfer, *Thermal conductivity, *Design data, Arizona, Prototype tests, Research and development, Power system operation, Energy conversion, Model studies, Environmental engineering, Environmental effects, Water yield improvement, Economic feasibility, Projections, Rainfall-runoff relationships.
Identifiers: Solar energy collectors.

Of several energy options open for research and development, the major contender is solar power farms, and they can be operational by 1985. A thermal conversion system was designed as a prototype that allows surface collectors to reach the high temperatures required by optical thin film coatings that absorb sunlight but prevent heat loss in the infrared. Material used, such as silicon, is opaque (absorbent) to sunlight but transparent to infrared radiation. Costs of such film is now low enough to make their use feasible. To reach desired operating temperature, sunlight is concentrated onto the coatings through lens that focus on a glass pipe and a following series of transfers. In describing a proposed solar energy farm, the designers point out that additional rainfall runoff from extensive collectors can materially improve the ability of an arid land to support growth of grasses of commercial importance to ranchers. Prime land for such a prototype farm appears to be 5000 sq. miles of collectors over the approximately 130,000 sq. miles of desert in the southwestern U.S. and northern Mexico. Environmentally, the energy balance will remain unchanged. If the world is to be prepared for alternative sources of energy by the time conventional sources are depleted, the solar energy farms here proposed may be the answer. (See also W73-10215) (Paylore-Arizona)
W73-10216

8B. Hydraulics

FLOW MEASUREMENT OF PUMP-TURBINES DURING TRANSIENT OPERATION,
Central Research Inst. of Electric Power Industry, Tokyo (Japan).
H. Suzuki, H. Nakabori, and A. Kitajima.
Water Power, Vol 24, No 10, p 366-370, Oct 1972.

Descriptors: *Flow measurement, *Pump turbines, *Discharge (Water), *Unsteady flow, Electronic equipment, Flowmeters, Ultrasonics, Oscillographs, Penstocks, Reynolds number, Hydraulic machinery, Foreign research, Velocity, Fluid mechanics, Instrumentation.
Identifiers: *Ultrasonic flow measurement, Japan, Probes (Instruments).

During transient operations of pump turbines, such as startup, input-rejection when pumping, and changing mode from power generation to pumping, the guidevane opening, rotational speed of the machines, discharge and pressure in the penstock all vary. Recording the changing conditions of the pump-turbine components on site is sometimes desirable to study flow characteristics under transient operating conditions. Since recording is difficult, discharge changes in a penstock have never before been measured in situ. Ultrasonic flowmeters used for steady-state flow measurements were adapted for measuring transient discharge with good results. An electromagnetic oscillograph records output from ultrasonic devices while measuring transient discharges. The theory and measuring apparatus used to determine flow in pump turbines during transient operating conditions are described. (USBR)
W73-09771

VERTICAL TURBULENT MIXING IN STRATIFIED FLOW - A COMPARISON OF PREVIOUS EXPERIMENTS,
California Univ., Berkeley. Coll. of Engineering.
J. E. Nelson.
Waste Heat Management Report No WHM-3, December 1972. 33 p, 3 fig, 8 tab, 21 ref. NSF-EI-34 932.

Descriptors: *Mixing, *Stratified flow, *Mathematical models, Velocity, Density, Hydraulics, Temperature, Momentum transfer, Momentum equation, Turbulence.
Identifiers: *Turbulent mixing, Richardson numbers, Transfer coefficients.

The decrease in both mass and momentum transfer coefficients with increasing stability has been clearly shown. Mathematical formulations to describe changes in the transfer coefficients usually presume only one independent non-dimensional parameter, having the form of a Richardson number. Large quantities of data have been gathered in both atmospheric and hydrologic environments with a variety of measuring techniques, and mass and momentum transfer coefficients have been calculated over a wide range of Richardson numbers. Unfortunately, the scatter of data is so great that almost no direct correlation can be deduced between the stability as defined by a Richardson number and any transfer coefficient. It is clear that none of the presently available mathematical formulations represent an acceptable match to all the experimental data. Evidently a Richardson number per se does not provide a complete description of the effect of stratification on vertical mixing. (Oleszkiewicz-Vanderbilt)
W73-09852

ANALYSIS OF THE INJECTION OF A HEATED, TURBULENT JET INTO A MOVING MAINSTREAM, WITH EMPHASIS ON A THERMAL DISCHARGE IN A WATERWAY,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.
For primary bibliographic entry see Field 05B.
W73-09876

HYDRAULIC MODELS PREDICT ENVIRONMENTAL EFFECTS.

World Dredging and Marine Construction, Vol 8, No 13, p 38-42, December 1972. 6 fig.

Descriptors: *Channels, *Estuaries, *Hydraulic models, *Model studies, *Environmental effects, *Hydraulic engineering, Engineering, Facilities, Project purposes.
Identifiers: *Waterways Experiment Station, Vicksburg (Miss), Mobile (Ala), James River, Hudson River.

A general description of the facilities and work of the U.S. Army Engineer Waterways Experiment Station (WES) in Vicksburg, Miss., is given. The WES Hydraulic Laboratory has about 60 hydraulic models in operation at any one time. Among them, the following are mentioned: A model of Mobile Bay, Alabama, to test the effects of the proposed Theodore Ship Channel on the general environment; an estuary model of the James River in the Chesapeake Bay to determine the effect of proposed dredging of the navigation channel; a model for the Federal navigation channels in the Hudson River between the Battery and the George Washington Bridge to study the improvement of present necessary dredging operations. The studies undertaken by WES are of a multidisciplinary character ranging from ecological and biological to engineering aspects of waterways problems. The staff of WES covers a wide range of specialities. A system analysis approach is emphasized in integrating different aspects of a problem, using results from models, field measurements, and other data sources. Instrumentation for monitoring of environmental variables as well as remote sensing and profiling are developed. Different techniques are developed to study particular waterways problems such as tidal modeling, dispersion of effluents, shoaling of channels and protection from hurricane surges. (Ensign-PAI)
W73-09883

LOCAL SCOUR UNDER OCEAN OUTFALL PIPELINES,
Montgomery (James M.), Inc., Pasadena, Calif.
For primary bibliographic entry see Field 08A.
W73-09902

CURRENT PROPOSALS FOR THE THAMES BARRIER AND THE ORGANIZATION OF THE INVESTIGATIONS,
Department of Public Health Engineering, London (England).
For primary bibliographic entry see Field 08A.
W73-10000

NAVIGATION CHANNEL IMPROVEMENT--GASTINEAU CHANNEL, ALASKA,
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
F. A. Herrmann, Jr.
Available from the National Technical Information Service as AD-753 337, $3.00 in paper copy, $0.95 in microfiche. Technical Report H-72-9, November 1972. 170 p, 18 fig, 48 plate, 68 photo, 8 tab.

Descriptors: *Navigation, *Channel improvement, *Shoals, *Erosion control, *Alaska, Model studies, Design criteria, Engineering structures, Dikes, Sediment transport, Sediment distribution, Sediment control, Channels, Hydraulic models, Testing procedures.
Identifiers: *Gastineau Channel (Alaska).

The existing Federal project through the Gastineau Channel, Alaska, provides for a navigation channel 4 ft deep at mllw (including overdepth dredging) with a bottom width of 75 ft. The channel was constructed in 1959-60 through an area with a prevailing bottom elevation of plus 10 to plus 15 mllw and soon experienced rapid shoaling at several locations. No maintenance dredging has been performed, primarily because of the large cost of moving a dredge to this remote area. A model study was conducted to determine the best means of resolving the shoaling problem. The model, constructed to linear scale ratios of 1:500 horizontally and 1:100 vertically, reproduced about 7 miles of Gastineau Channel from Fritz Cove on the west to 1 mile north of Juneau, Alaska, on the east. It was equipped to reproduce and study prototype tides, tidal currents, freshwater inflow, and shoaling. The model tests showed that any one of several impermeable dikes with a top elevation above high water and located along the north side of the navigation channel would reduce shoaling by 80 to 85%. Diversion of Fish Creek away from the navigation channel would result in an additional 5% reduction. The shortest dike tested was 17,250 ft long, and the shoaling reduction for this plan was essentially the same as that for longer dikes. (Woodard-USGS)
W73-10320

FIELD OBSERVATIONS OF EDGE WAVES,
Institute of Coastal Oceanography and Tides, Birkenhead (England).
For primary bibliographic entry see Field 02E.
W73-10327

REGIMES OF FORCED HYDRAULIC JUMP,
Alberta Dept. of Environment, Edmonton. Design and Construction Div.
V. Mura Hari.

Water Resources Bulletin, Vol 9, No 3, p 613-617, June 1973. 1 fig, 8 ref.

Descriptors: *Hydraulic jump, *Supercritical flow, *Critical flow, Turbulent flow, Froude number, Open channel flow, Regime.

The various types of forced hydraulic jumps formed with the assistance of baffle walls and baffle blocks and methods of analysis and research required to understand these flow configurations are briefly discussed. In a laboratory flume, to form a hydraulic jump at a particular location, presence of adequate tailwater is necessary in the basin. In the field, the tailwater depths are due to the incoming supercritical flow rather than being present beforehand. Once a certain discharge is let into a canal or a stream in the form of a supercritical jet, the development of the tailwater depends on the hydraulic properties of the downstream channel. (Knapp-USGS)
W73-10331

FIELD HYDRAULIC STUDIES,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-10341

OBSERVED VS. CALCULATED REAERATION CAPACITIES OF SEVERAL STREAMS,
For primary bibliographic entry see Field 05B.
W73-10351

RELATIONSHIPS BETWEEN HYDRAULIC PROPERTIES AND REAERATION,
Georgia Inst. of Tech., Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-10352

8C. Hydraulic Machinery

TRANSMISSION INTERCHANGE CAPABILITY--ANALYSIS BY COMPUTER,
Commonwealth Edison Co., Chicago, Ill.
G. L. Landgren, H. L. Terhune, and R. K. Angel.
Inst Electr on Eng Trans Power Appar Syst, Vol PAS-91, No 6, p 2405-2414, Nov-Dec 1972. 10 p, 6 fig, 6 ref, disc.

Descriptors: *Computer programs, Electric power, Energy transfer, Extra high voltage, Electric power production, Transmission (Electrical), Power system operations, Reliability, Transmission lines.
Identifiers: Interchanges, Outages, *Load flow, *Power interchange, Interconnected systems, Overloads.

Until recently, interchange capability has not been widely used, since few high-capacity transmission ties existed between power systems. With the growth in the number of EHV interconnections, as well as generating unit size, the choice of suitable key and limiting facilities for examination of an interchange capability study has become more complex. Many more conditions must be investigated now because of system size and the number of interconnections. These investigations have resulted in large expenditures of computer, engineering, and clerical time. A program developed for determining the transmission system interchange capability and those outages and elements which could limit the transfer of energy between interconnected power systems is discussed. The method has been extensively tested during interchange capability studies of the Mid-America interpool Network (MAIN). The program is an effective planning and operating tool, reducing both engineering and computer time required to analyze interchange limitations, yet maintaining accuracy within a 5% tolerance. (USBR)
W73-09764

OVERVOLTAGES AND HARMONICS ON EHV SYSTEMS,
Westinghouse Electric Corp., Pittsburgh, Pa.
E. R. Taylor.
Inst Electra Electron Eng Trans Power Appar Syst, Vol PAS-91, No 6, p 2537-2544, Nov-Dec 1972. 10 fig, 4 tab, 5 ref, disc.

Descriptors: *Extra high voltage, *Transmission lines, Frequency, Capacitors, Electric currents, Networks, Digital computers, Electrical power, Alternating currents, Transmission (Electrical).
Identifiers: *Overvoltage, *Harmonics, Series compensation, Line charging, Series capacitors.

One system condition that produces steady state 60-hz overvoltages is a relatively long, lightly loaded or unloaded EHV line connected to the system at only one end, the sending end of the line. Under no-load or a lightly loaded system the transmission line acts as a capacitance at the fundamental frequency of 60 hz. The capacitive charging current of the line causes a voltage rise from the system voltage source to the sending end of the line and from the sending end to the receiving end. To reduce the high overvoltages and absorb excess vars produced under these conditions, shunt reactors are usually added to the line. In practice, shunt reactors directly connected to the line usually do not compensate entirely all line capacitance. Therefore, a long shunt compensated line acts as a capacitance to some degree at the 60-hz frequency and may experience high steady state overvoltages in the line when fed by a weak source. Discussed are results of digital and transient network analyzer (Anacom) studies made to analyze the effect of system parameters on harmonics in steady state overvoltages. Factors influencing harmonic distortion of steady state voltages were emphasized. (USBR)
W73-09768

EFFECT OF LOAD CHARACTERISTICS ON THE DYNAMIC STABILITY OF POWER SYSTEMS,
Servicos de Electricidade S.A., Sao Paulo (Brazil).
A. Semlyen.
Inst Electra Electron Eng Trans Power Appar Syst, Vol PAS-91, No 6, p 2295-2304, Nov-Dec 1972. 8 fig, 12 ref, 3 append, disc.

Descriptors: *Power system operation, *Digital computers, *Stability, Dynamics, Electric generators, Electric motors, Equations, Resistance, Foreign research, Electrical impedance, Canada.
Identifiers: *Power loads, Brazil, Reactive loads.

Small signal stability (also called steady state or dynamic stability) is receiving increasing attention from power engineers. Improvement in equipment design, resulting in the introduction of sophisticated control systems and generators with higher reactances, makes knowledge of the limits of stable operation equally important in steady state and under transient conditions. New concepts in control theory, powerful computer systems, and mathematical algorithms have provided accurate models for representing synchronous generators, both in steady state and transient stability studies. Nonsynchronous loads have been considered either as constant impedances, or as static elements whose active and reactive powers are related to voltage through algebraic nonlinear equations. A proposed method based on the state space theory, can be applied to any type of terminal equipment to more accurately represent steady state loads in stability investigations. The influence of dynamic load behavior on the stability limit of a power system is shown. State space methods of application are exemplified. (USBR)
W73-09769

FLOW MEASUREMENT OF PUMP-TURBINES DURING TRANSIENT OPERATION,
Central Research Inst. of Electric Power Industry, Tokyo (Japan).
For primary bibliographic entry see Field 08B.
W73-09771

LARGE SCALE SPRAY COOLING,
Richards of Rockford, Inc., Ill.
For primary bibliographic entry see Field 05D.
W73-09850

MUNICIPAL WATER SYSTEMS - A SOLUTION FOR THERMAL POWER PLANT COOLING,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05F.
W73-09851

REMOTE CONTROL OF IRRIGATION SYSTEMS,
Akademiya Nauk Kirgizskoi SSR, Frunze. Institut Automatiki i Telemekhaniki.
For primary bibliographic entry see Field 03F.
W73-10214

8D. Soil Mechanics

TARBELA DAM CONSTRUCTION REACHES HALF-WAY MARK,
Tippetts-Abbett-McCarthy-Stratton, New York.
L. A. Lovell, J. Lowe, III, and W. V. Binger.
Water Power, Vol 24, No 9-10, Part I-II, p 317-325, Sept-Oct 1972. 20 p, 18 fig, 8 photo, 2 tab.

Descriptors: *Earth dams, *Dam construction, Rockfill dams, Switchyards (Electrical), Reservoir silting, Hydroelectric plants, Outlet works, Intake structures, Hydraulic gates, Hydraulic structures, Bulkhead gates, Tunnel construction, Dam foundations, Cofferdams, Tunnel linings, Foreign projects, Spillways, Diversion structures.
Identifiers: *Tarbela Dam (Pakistan), *Pakistan, Austrian tunneling method.

Tarbela Dam, the world's largest fill dam, has risen 225 ft of the planned height of 470 ft. The dam design has a cobble gravel and sandy silt sloping core supported on the upstream and downstream sides by well-graded granular shells. A foundation of mainly deep (up to 700 ft) cobble gravel and fine sand necessitated extending the dam core 5700 ft upstream. The usable reservoir capacity of 9.3 million acre-ft is expected to be lost to sediment after 50 or 60 yrs, but the power-generating capacity will remain. Construction began in 1968 with excavation of a 3-mi-long diversion channel, 4 tunnels, and placement of a small section of the embankment located between the diversion channel and the natural river channel. In October 1970, the river was diverted into the diversion channel, and construction began on the entire length of the main embankment, except the section where the diversion channel flows. Future closing of a buttress dam built across the diversion channel will divert the riverflow through the 4 tunnels. Details of the project are discussed, including: the main embankment, auxiliary dams, materials processing and handling, spillways, tunnels, intake and outlet structures, gate operation structures, and mechanical and electrical equipment. (USBR)
W73-09762

DYNAMIC DESIGN OF DAMS FOR EARTHQUAKES,
F. P. Jaecklin, and W. A. Wahler.
Int Civ Eng Vol 2, No 9, p 420-426, Mar 1972. 7 p, 9 fig, 9 ref.

Descriptors: *Dam design, *Seismic design, Earth dams, Earthquakes, Dynamics, Dams, Soil dynamics, Deformation, Vibrations, Structural design.
Identifiers: *Dam ability, Computer-aided design, Earthquake loads, Earthquake-resistant structures, Stability analysis, Seismic stability.

In the past, the pseudostatical method, which assumes a particular horizontal acceleration, was used in earthquake design of dams in Europe and other parts of the world. Dam deformation may be more realistically predicted by considering specific earthquake hazards of the damsite, dynamic strength properties of the foundation and fill, and the dynamic deformation characteristics of the dam. This study shows that earthquakes may induce considerably higher stresses in a dam than any other load, and that a dam may be less safe than predicted by earlier methods of analysis. Particularly unfavorable conditions exist when the natural frequency of the dam is close to the expected earthquake vibration frequencies. Experience gained in the application of this method leads to the conclusion that not only is a higher effective safety ensured, but weak points can be detected in the design stage. This dynamic method influences determination of the face slopes, degree of compaction of the fill, height of the crest above the headrace level, and dimensions of the filter and drainage system. (USBR)
W73-09766

AN APPROACH TO ANALYSIS OF ARCH DAMS IN WIDE VALLEYS,
Southampton Univ. (England). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08A.
W73-09841

RESTORATION OF HISTORIC LOW FLOW DIVERSION TO ARROYO COLORADO; LOWER RIO GRANDE FLOOD CONTROL PROJECT, TEXAS (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Dallas, Tex. Southwestern Div.
For primary bibliographic entry see Field 04A.
W73-10264

8E. Rock Mechanics and Geology

STUDY OF EXPANSION-TYPE ROCK BOLTS IN MINE-GALLERY AND TUNNEL CONSTRUCTION,
For primary bibliographic entry see Field 08H.
W73-09760

8F. Concrete

UNDERWATER CONCRETE CONSTRUCTION,
B. C. Gerwick, Jr.
Mech Eng, Vol 94, No 11, p 29-34, Nov 1972. 6 p, 4 illus, 3 photo, 3 dwg, 6 ref.

Descriptors: *Underwater construction, *Concrete construction, *Concrete placing, Grouting, Concrete mixes, Concrete technology, Construction, Concretes, Reinforcement, Bentonite, Concrete control, Concrete testing, Bonding.
Identifiers: Grout mixes, Underwater structures, Heat of hydration, Laitance, *Tremie concrete.

Underwater concrete construction is reliable and proven. Techniques exist for placement at all depths at which other construction can be performed. Four basic methods described are: tremie, bucket, grout-intruded aggregate, and grouting. The essential element of tremie concrete placement is that the concrete must be discharged beneath the surface of previously placed concrete in a manner that least disturbs that surface. Concrete dropped directly through sea water will segregate into sand and gravel, with the cement going into collodial suspension. High-quality, durable, water-resistant structures can be achieved if procedures are rigidly followed to avoid errors which are far more serious underwater than with conventional dry concrete. Selection of the proper method to use must consider: (1) depth; (2) working conditions, such as rough seas; (3) logistics (supply); (4) degree of confinement in forms; (5) size of pour; (6) fluid to be displaced--sea water or drilling mud; (7) reinforcement and inserts; (8) total volume; and (9) economical factors. Future direction of underwater concrete construction is discussed. (USBR)
W73-09763

WET-TYPE HYPERBOLIC COOLING TOWERS,
Alfred A. Yee and Paul Rogers, Inc., Los Angeles, Calif.
P. Rogers.
Civil Engineering - ASCE, Vol 42, No 5, p 70-72, May 1972. 6 fig.

Descriptors: *Cooling towers, *Design criteria, *Concrete structures, Electric power production, Thermal powerplants, Water cooling, Design, Reinforced concrete, Structural design, Dead loads, Structural engineering, Wind pressure, Model studies, Graphical analysis, Waste water treatment.

Wet-type hyperbolic reinforced concrete cooling towers operate on principles of convection and evaporation. There are several towers in the design or construction stage of 500 feet height and cooling capacities up to 600,000 gallons per minute. The main parts of a hyperbolic cooling tower are the tower shell, the internal fill, the hot water intake, the collecting pond, the cold water return, and auxiliary installations. The hyperbolic shell and its foundation are discussed. The forces considered are the dead load, wind, and seismic forces. Present stress analysis of shells is usually based on the so-called membrane theory in response to seismic stress. The bottom part of the shell acts as a lintel, transferring loads from the continuous shell to the diagonal columns. A simplified graphical method to obtain the maximum compression and tension forces in columns has been developed. Serious attention has been given to the development of steel towers for future use. (Jerome-Vanderbilt)
W73-09857

8G. Materials

SEISMIC RISK AND DESIGN RESPONSE SPECTRA,
Massachusetts Inst. of Tech., Cambridge.
E. H. Vanmarcke, and C. A. Cornell.
Paper ASCE Special Conference on Safety and Reliability of Metal Structure, Pittsburgh, Pa, p 1-25, Nov 1972. 25 p, 7 fig, 19 ref.

Descriptors: *Earthquake engineering, *Seismic design, *Earthquakes, Dynamics, Statistical methods, Probability, Vibration, Risks, Attenuation, Soil dynamics, Structural design, Mathematical analysis, Bibliographies, Seismic studies, Seismic waves.
Identifiers: Earthquake forecasting, Ground amplitude.

The problem of predicting seismic structural response is enlarged by linking the problems of predicting earthquakes and of specifying the characteristics of ground motions at a given site. A method of seismic risk analysis provides a relationship between the ground motion parameters and the average return period. When combined with factors recommended by Newmark's method, the relationship developed can be used to obtain a design response spectrum corresponding to a specified average return period. The design response spectrum can be used directly to predict the peak response in each mode of a linear elastic structure. Using the response spectrum approach, the individual modal maxima are combined, usually by the square root of the sum of the squares, to provide the design peak response of the complete structure. If a time-history analysis or a random vibration approach are used to estimate structural response, then actual design level ground motions or their principal statistical properties (spectral density funtion, duration) must be specified, often using the design response spectrum as a start. The design response spectrum does not uniquely define the frequency content of potentially damaging ground motions. (USBR)
W73-09761

DYNAMIC DESIGN OF DAMS FOR EARTHQUAKES,
For primary bibliographic entry see Field 08D.
W73-09766

A NEW METHOD OF DETECTING LEAKS IN RESERVOIRS OR CANALS USING LABELLED BITUMEN EMULSIONS,
Centre d'Etude de l'Energie Nucleaire, Grenoble (France).
J. Molinari, J. Guizerix, and R. Chambard.
International Atomic Energy Agency, Ser IAEA-SM-129/47, Isot Hydrol, Vienna, Austria, p 743-760, 1970. Transl from Fr, 1971. 11 fig, 6 ref, disc.

Descriptors: *Reservoir leakage, *Canal seepage, *Emulsions, Leakage, Radioisotopes, Iodine radioisotopes, Hydraulic structures, Bituminous materials.
Identifiers: *Radioactive tracers, *Detection, Field permeability test, France, Detectors, Bitumens.

A method of detecting and localizing leaks in natural or artificial lakes, reservoirs, canals, or wells is described. The method consists of injecting an emulsion labeled with a radioactive tracer into the water. The labeled emulsion is entrained into the leakage areas where emulsion particles separate from the water and accumulate. The distribution of these particles, considered as proportional to the specific infiltration flow for structures with interstitial permeability, is then determined by measuring the radioactivity. The plastic properties of bitumen labeled emulsion promote agglomeration of the particles and adhesion to the materials of the revetment or wall to be studied. Preparation and use of a bitumen emulsion labeled with iodine-131 in detecting leaks in a canal are described. This method of leak detection has a wide range of application, and can be used to study relative permeabilities of strata in which wells, pits, or boreholes have been drilled, and to distinguish between areas of varying permeabilities. (USBR)
W73-09770

COOLING WATER,
Drew Chemical Corp., Parsippany, N.J.
For primary bibliographic entry see Field 05D.
W73-09861

THE EFFECT OF MARINE FOULING ON CORROSION OF METALS ANTI-CORROSION TECHNIQUES (INFLUENCE DE LA SALISSURE MARINE SUR LA CORROSION DES METAUX ET MOYENS DE PREVENTION),
Electricite de France, (Chatou). Service Etudes et Projets Thermiques et Nucleaires.
M. Bureau, and R. Boyer.
Houille Blanche, Vol 205, Special No 2-3, p 189-198, 1972. 8 fig, 1 tab.

Descriptors: *Coasts, *Electric power plants, Water pollution control, Research, *Fouling, *Corrosion, *Erosion, *Pollutants, Inorganic compounds, Sands, Organic wastes, Bacteria, Algae, Crustaceans, Antifouling materials, Coatings, Chlorination, Cleaning, Equipment, Design.

Electricite de France has stepped up research efforts on marine pollution, resulting metal corrosion, and anti-corrosion techniques due to the rapidly growing number of coastal power stations. The effects of inorganic (sand and various debris) and organic (bacteria, crustaceans, algae, and decomposition products) pollutants on corrosion and on corrosion-erosion are discussed. Protective methods aim at preventing pollution or minimizing pollution effects. Chemical protection methods include antifouling coatings and chlorination of circuit water. Continuous mechanical cleaning of tubes, filtration and seawater heating are examples of the physical protection methods. Chlorine dosing and chlorine production methods are also discussed. General plant design, and equipment are presented. (Ensign-PAI)
W73-10146

WHY CORROSION PRODUCTS MUST BE CONTROLLED IN POWER PLANT WATERS,
Battelle-Pacific Northwest Labs. Richland, Wash.
T. F. Demmitt, and A. B. Johnson, Jr.
Available from NTIS, Springfield, Va., as BNWL-SA-4051; $4 in paper copy, $0.95 in microfiche. Report BNWL-SA-4051, Dec 1971, 8 p, 4 ref.

Descriptors: *Corrosion control, *Cost-benefit analysis, Research and development, *Cooling water, Physicochemical properties, Instrumentation, Remote sensing, Separation techniques, Water pollution control, *Waste water treatment, Powerplants, Programs, Forecasting, Thermal pollution.

The desirability is stressed of establishing corrosion-control programs. Emphasis is placed on the nature of corrosion-product films and mechanisms of their formation. Other important studies are the transport processes of corrosion products in coolant streams, including means of removal (ion exchange; filtration; and electrostatic, electromagnetic, and centrifugal separation methods). Operator-alarm instrumentation has benefitted from developments in methods for predicting deposit formation. Prediction of effects from changes in systems materials will benefit from longer-range studies that are more quantitative. (Bopp-ORNL)
W73-10182

8H. Rapid Excavation

STUDY OF EXPANSION-TYPE ROCK BOLTS IN MINE-GALLERY AND TUNNEL CONSTRUCTION,
M. Ladner.
Zurich Federal Institute of Technology Dissertation, No 4197, p 34-42, 1969. Transl from Ger, Bur Reclam Transl 709, May 1971. 13 p, 7 fig.

Descriptors: *Rock bolts, *Roofs, *Tunnel design, *Underground structures, Tunnel construction, Rock excavation, Mining engineering, Tensile strength, Mechanical properties, Prestressing, Rock mechanics, High strength steels.
Identifiers: *Expansion bolts, Switzerland, Foreign studies, Galleries, Rock pressures.

This translation from the German is the third part or conclusions of the report, Study of Expansion-Type Rock Bolts in Mine-Gallery and Tunnel Construction. (The first and second parts, on rock bolting theory and experimental tests, respectively, have not been translated.) Practical applications of theoretical and experimental research are presented. To ensure safety, the bolts and installation must be dependable. Steel of high tensile strength, yield point, and offset yield point is desirable because thinner bolts may be used and holes drilled quicker since diameter may be smaller. Desirable properties of bolts are: small deformation, high load-bearing capacity, and slow loss of capacity over prolonged usage. To obtain these properties, installation precautions which must be taken are: (1) hole diameter must suit the bolt; (2) drilling method used depends on type of rock, (3) bolt should be screwed into the full depth of the cone, and (4) the tip of the bolt should always be in sound rock. The best rock bolt arrangement in a gallery determined from the theoretical investigation of stress conditions around prestressed bolts is exemplified. Use of inclined bolts to reduce stress concentration in a gallery roof is described. (USBR)
W73-09760

8I. Fisheries Engineering

STREAM CATALOG--PUGET SOUND AND CHEHALIS REGION,
Washington State Dept. of Fisheries, Olympia.
For primary bibliographic entry see Field 07C.
W73-09787

RESERVOIR RELEASE RESEARCH PROJECT.
For primary bibliographic entry see Field 05G.
W73-10261

EVALUATION OF PISCICULTURAL QUALITIES OF ROPSHA CARP, (IN RUSSIAN),
K. V. Kryazheva.
Izv Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 74, p 45-54, 1971. English summary.
Identifiers: *Carp (Ropsha), Growth, Hybrids, Piscicultural studies, *Temperature resistance, USSR.

Ropsha carp hybrids from the 5th breeding generation were evaluated. Underyearlings had a slightly better growth rate. In the second yr of life, hybrids and non-hybrids grew at the same rate. Hybrid vigor was observed for such indices as general viability Hb content of the blood for hybrids of the first generation. Amur wild carp were most resistant to high and low temperatures. Ropshi carp differed from hybrids of the first generation by their decreased resistance to heat and increased resistance to cold.--Copyright 1973, Biological Abstracts, Inc.
W73-10355

CULTIVATION OF CARP IN RICE PADDIES OF WESTERN FERGANA AND THE EFFECT OF FISH ON RICE YIELD, (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W73-10359

FEEDING OF BABY FISH OF THE GRAND AMUDAR SHOVEL-HEADED STURGEON, (IN RUSSIAN),
N. I. Sagitov.
Uzb Biol Zh. Vol 15, No 5, p 64-65, 1971. Illus.
Identifiers: Baby fish, Chironomid larvae, Feeding (Fish), Larvae, *Sturgeon, USSR.

In May-June of 1964, 34 baby fish were obtained. They were, on the average, 53.4 mm long, and 715 mg in weight. Analysis of the content of esophagus and stomach showed that chironomid larvae was their principal food item.--Copyright 1973, Biological Abstracts, Inc.
W73-10360

TRANSPLANTATION OF FISH AND AQUATIC INVERTEBRATES IN 1968, (IN RUSSIAN),
A. F. Karpevich, and N. K. Lukonina.
Vopr Ikhtiol. Vol 12, No 2, p 364-380, 1972.
Identifiers: Aquatic invertebrates, *Salmon, *Smelt, *Transplantation (Fish), *USSR, Fish.

The introduction of fish and invertebrates into bodies of water in the USSR during 1968 is described, mainly in table form. There was some increase in the number of transplanted salmon from 1967, as well as the number of smelt, which had not been handled during the previous year.--Copyright 1973, Biological Abstracts, Inc.
W73-10366

INFORMATION ON THE REPRODUCTION OF CHINOOK SALMON ONCORHYNCHUS TSCHAWYTSCHA (WALBAUM) IN THE KAMCHATKA RIVER, (IN RUSSIAN),
B. B. Vronskii.
Identifiers: Information, *Kamchatka River, Oncorhynchus-tschawytscha, *Reproduction, Rivers, *Salmon (Chinook), USSR.

The spawning grounds of chinook salmon in the Kamchatka River basin were investigated. Data on the dynamics of runs, spawning duration, variations in the sexual composition during runs and reproduction, and behavior of reproducing fishes at the spawning grounds were collected. Spawning was confined to channel portions of flowing systems. Areas with strong vertical current in the subchannel flow associated with certain microreliefs were selected. The spawning period for the majority was associated with lowered water levels after high flood and coincided in different spawning tributaries. The large loss of eggs during laying is counteracted to a certain extent by the high viability of eggs and larvae. The factors limiting the number of chinook salmon are insufficient numbers of spawning grounds and loss of eggs.--Copyright 1973, Biological Abstracts, Inc.
W73-10367

FEEDING OF MIKIZHA SALMO MYKISS WALB. IN SOME KAMCHATKA WATERS, (IN RUSSIAN),
L. V. Kokhmenko.
Vopr Ikhtiol. Vol 12, No 2, p 319-328, 1972. Illus.
Identifiers: Amphibians, Invertebrates, *Kamchatka River, *Mikizha (Feeding), *Salmo-mykiss, Salmon, Smelt, Stickleback, USSR.

The feeding of underyearlings and yearlings in the Kishimshinaya River and of adult fishes in piedmont tributaries of the middle Kamchatka River was investigated. Mikizha have a wide spectrum of food including aquatic terrestrial invertebrates, fish, including salmon, stickleback, smelt and less often char, kundzha, goldfish, plus amphibians and mammals. Salmon eggs are not a significant factor in their diet, though char eggs are. The role of mikizha in the production of salmon stocks is minor due to its relatively small numbers. By feeding on competitors for food, it improves fattening conditions for salmon.--Copyright 1973, Biological Abstracts, Inc.
W73-10368

THE WATER DIVIDER AND REPRODUCTIVE CONDITIONS OF VOLGA STURGEON, (IN RUSSIAN),
Kaspiiskii Nauchno-Issledovatelskii Institut Rybnogo Khozyaistva, Astrakhan (USSR).
P. N. Khoroshko.
Vopr Ikhtiol. Vol 12, No 2, p 388-391. 1972.
Identifiers: Reproduction, *Sturgeon, USSR, *Volga River, *Water divider, Spawning.

A water divider was constructed to improve spawning conditions for fish after the Volgograd Hydroelectric Power Station was built, but the measure was detrimental to sturgeon. After the power station was constructed, 50% of the natural reserves of Volga-Caspian sturgeon were lost, and the damage increased after construction of the water divider. The deterioration resulted from the nature of flooding, abnormal wintering conditions, silting of spawning grounds, alteration of benthic biocoenoses and loss of more spawning grounds. The construction of artificial beds on the

downstream side is necessary to keep a genetically rich brood stock.--Copyright 1973, Biological Abstracts, Inc.
W73-10393

EFFECT OF AIR TEMPERATURE, DENSITY OF STOCKING AND NATURE OF THE PONDS ON THE WEIGHT INCREASE IN CARP UNDERYEARLINGS AND THE PRODUCTIVITY OF CARP BREEDING PONDS IN NORTHWEST RUSSIA, (IN RUSSIAN),
N. V. Tolmacheva.
Izv Nauchno-Issled Inst Ozern Rechn Rybn Khoz. 74, p 13-29. 1971. English summary.
Identifiers: Air temperature, Breeding, *Carp (Ropsha), Feeding, Ponds, Productivity, Russia, Underyearlings, USSR, *Weight (Carp), Stocking density, *Water temperature.

Data on the raising of Ropsha carp hybrid underyearlings in the ponds of Ropsha, USSR for 10 yr are analyzed statistically. The effect of temperature on weight increase is shown. The effect of stocking density on weight increase is great, but less than that of temperature. In small ponds both temperature and the density of stocking affected the weight increase more and productivity less than in larger ponds. In all cases more than half of the total variability was determined by unconsidered 'random' factors, the most important of which was probably the feeding capacity of the ponds.--Copyright 1973, Biological Abstracts, Inc.
W73-10396

09. MANPOWER, GRANTS AND FACILITIES

9B. Education (In-House)

MARINE ENVIRONMENTAL TRAINING PROGRAMS OF THE U.S. NAVY,
Naval Oceanographic Office, Washington, D. C.
For primary bibliographic entry see Field 05G.
W73-10143

9C. Research Facilities

THE SAVANNAH RIVER PLANT SITE,
Savannah River Ecology Lab., Aiken, S.C.
For primary bibliographic entry see Field 06G.
W73-10167

9D. Grants, Contracts, and Research Act Allotments

SUMMARY OF PLANS FOR AQUISITION OF WATER DATA BY FEDERAL AGENCIES, FISCAL YEAR 1974.
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07A.
W73-09798

10. SCIENTIFIC AND TECHNICAL INFORMATION

10A. Acquisition And Processing

A SURVEY OF GOVERNMENTAL AGENCIES, STUDIES AND PUBLICATIONS CONCERNED WITH THE ENVIRONMENT OF THE SOUTHERN CALIFORNIA COASTAL ZONE,
University of Southern California, Los Angeles. Sea Grant Program.
L. M. Baird.
Available from the National Technical Information Service as COM-72-11116, $3.00 in paper copy, $0.95 in microfiche. University of Southern California Sea Grant Publication No. USC-SG-2-72. January 1972. 146 p, 1 append. SG 2-35227.

Descriptors: *Coastal areas, *Information exchange, Bibliographies, Publications, Environmental effects, California.
Identifiers: *Coastal zone, Los Angeles County, Orange County.

This survey is a preliminary effort at cataloguing governmental sources of information dealing with the coastal zone of Southern California. Governmental agencies are potentially a rich source of information, but the documents and reports are not readily accessible because of the wide dispersion of agencies and a lack of systematic listings. This report, though limited in scope, is an attempt to provide an inventory to aid researchers in identifying and locating many of these source materials. The main part of the survey is a bibliography of government reports arranged according to subject. Other sections include a survey of state agency activities, a listing of selected Los Angeles County agencies, plans and activities of the seventy-seven cities within Los Angeles County, plans and activities in Orange County, major coastal zone plans and studies in Southern California, and libraries and other information sources in Southern California. The appendix includes state legislation affecting the California coast in 1971. (Elfers-North Carolina)
W73-09823

10C. Secondary Publication And Distribution

CLADOPHORA AS RELATED TO POLLUTION AND EUTROPHICATION IN WESTERN LAKE ERIE,
Ohio State Univ., Columbus. Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-09757

POLLUTION RELATED STRUCTURAL AND FUNCTIONAL CHANGES IN AQUATIC COMMUNITIES WITH EMPHASIS ON FRESHWATER ALGAE AND PROTOZOA,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-09875

NEW METHODS OF SOIL RECLAMATION IN ARID LANDS, (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W73-09981

GEOMETRY OF SANDSTONE RESERVOIR BODIES,
Shell Oil Co., Houston, Tex.
For primary bibliographic entry see Field 02F.
W73-10026

A REVIEW OF SOME MATHEMATICAL MODELS USED IN HYDROLOGY, WITH OBSERVATIONS ON THEIR CALIBRATION AND USE,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02A.
W73-10061

GEOTHERMAL WATER AND POWER RESOURCE EXPLORATION AND DEVELOPMENT FOR IDAHO,
Boise State Coll., Idaho. Dept. of Geology.
For primary bibliographic entry see Field 06B.
W73-10217

POSSIBLE EFFECTS OF THERMAL EFFLUENTS ON FISH: A REVIEW,
Washington, Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 05C.
W73-10238

FISH PROTEIN CONCENTRATE: A REVIEW OF PERTINENT LITERATURE WITH AN EMPHASIS ON PRODUCTION FROM FRESHWATER FISH,
State Univ., Coll., Buffalo, N.Y. Great Lakes Lab.
For primary bibliographic entry see Field 03E.
W73-10313

BENEFIT-COST ANALYSIS FOR WATER RESOURCE PROJECTS,
Tennessee Valley Authority, Muscle Shoals, Ala.
For primary bibliographic entry see Field 06B.
W73-10318

A REVIEW OF METHODS FOR PREDICTING AIR POLLUTION DISPERSION,
National Aeronautics and Space Administration, Hampton, Va. Langley Research Center. National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 05A.
W73-10324

10F. Preparation of Reviews

COOLING PONDS - A SURVEY OF THE STATE OF THE ART,
Hanford Engineering Development Lab., Richland, Wash.
For primary bibliographic entry see Field 05D.
W73-09849

POLYCHLORINATED BIPHENYLS-ENVIRONMENTAL IMPACT. A REVIEW BY THE PANEL ON HAZARDOUS TRACE SUBSTANCES. MARCH 1972,
Minnesota Univ., St. Paul. Coll. of Veterinary Medicine.
For primary bibliographic entry see Field 05B.
W73-10221

SUBJECT INDEX

ABSORPTION
Environmental Surveillance for Radioactivity in the Vicinity of the Crystal River Nuclear Power Plant, An Ecological Approach,
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ACCRETION
Erosion and Accretion of Selected Hawaiian Beaches 1962-1972,
W73-09879 2J

ACCRETION (LEGAL ASPECTS)
Board of Trustees of the Internal Improvement Trust Fund V. Madeira Beach Nominee, Inc. (Ownership of Land Accreted Due to Public Improvement Project).
W73-10294 6E

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Bioxidation of Waste in Activated Sludge: I. Measuring Oxygen Respiration of Activated Sludge By Means of Polarographic and Oxygen Probe Methods,
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ADAPTATION
Temperature Adaptation of Embryonic Development Rate Among Frogs,
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W73-10297 6E

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Tombigbee Valley Development Authority.
W73-10288 6E

Regional Water Distribution Districts.
W73-10302 6E

ADMINISTRATIVE REGULATIONS
Storage Facilities (For Hazardous Substances) Regulation Presented at Hearing on March 21, 1973.
W73-10258 5G

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W73-10259 5G

Missouri Water Pollution Control Board Regulations for Turbid Water Discharges, (To Prevent Intermittent or Accidental Pollution of Waters of the State).
W73-10260 5G

Water Well Construction Act.
W73-10304 6E

Water Supply Quality Control.
W73-10309 6E

ADSORPTION
Supposed Toxicities of Marine Sediments. Beneficial Effects of Dredging Turbidity,
W73-09880 5G

ADVECTION
Evapotranspiration of Different Crops in A Mediterranean Semi-Arid Region, (In French),
W73-09836 2D

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Air Injection at Lake Cachuma, California,
W73-09799 5G

Process for the Bio-Oxidation of Nitrogen Deficient Waste Materials,
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Effect of Artificial Aeration on Some Hydrochemical Indices of Water Quality, (In Russian),
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Evaluation of North Water Spring Ice Cover From Satellite Photographs,
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French Speaking Africa South of Sahara and Madagascar, Inland Water Production, (In French),
W73-10372 2I

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Choice of Products for Control Against Pollution of the Marine Environment by Hydrocarbons. II. Efficacy of Antipetroleum Products, (Choix de Produits Pour Lutter Centre La Pollution du Milieu Marin Les Hydrocarbures. II. Efficacite des Produits Antipetrole),
W73-10114 5G

Choice of Products for Control Against Pollution of the Marine Environment by Hydrocarbons. III. The Relative Toxicity of Antipetroleum Products on Two Marine Organisms, (Choix De Produits Pour Lutter Contre La Pollution Du Milieu Marin Par Les Hydrocarbures. III. Toxicite Relative De Produits Antipetrole Sur Deux Organismes Marins),
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Effects of Fluorine in Cattle: A Summary of Results of Studies Over A Number of Years in

the Neighborhood of A Hydrofluoric Acid Factory and An Aluminum Factory (In German),
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Air Flow Land-Sea-Air-Interface: Monterey Bay, California - 1971,
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W73-10287 6E

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W73-10288 6E

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Sewage Collection, Etc., Facilities.
W73-10290 6E

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Production Ecology of Glacier Brooks in Alaska and Lapland, (In German),
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Navigation Channel Improvement--Gastineau Channel, Alaska,
W73-10320 8B

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Methods of Alfalfa Irrigation Under Conditions of High Groundwater Table, (In Bulgarian),
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Ecology of a Eutrophic Environment: Mathematical Analysis of Data, (In French),
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Environmental Levels of Radioactivity in the Vicinity of the Lawrence Livermore Laboratory: 1972 Annual Report,
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Modes of Action and Methods of Application of Soil Conditioners for Improving Physical Properties of the Soil, (In German),
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Humidity Reactions of the Young of the Terrestrial Isopods Porcellio scaber Latr. and Tracheoniscus rathkei (Brandt),
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Short-Range Forecast of Maximum Flood Discharges on the Kyzylsu River and Its Tributaries (Karatkosrochnyy prognoz maksimal'nykh raskhodov pavodkov na r. Kyzylsu i yeye pritokakh),
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African Journal of Tropical Hydrobiology and Fisheries.
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St. Louis Region Water and Sewerage Facilities Supplement Number 1 - Programming,
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Faunistic Ecological Study of Creeks of East. Flanders and Those Along Scheldt River: Considerations on Their Chemistry Plantonic, Entomological, and Malacological Fauna and a Discussion of Their Current Biological Status, (In French),
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Systems Analysis of Mineral Cycling in Forest Ecosystems,
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Formation of Heat Cracks in Ice Cover of Rivers and Bodies of Water (Usloviya obrazovaniya termicheskhikh treshchin v ledyanom pokrove rek i vodoyemov),
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GOTEBORG UNIV. (SWEDEN). DEPT. OF ANALYTICAL CHEMISTRY.
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Formation and Diagenesis of Inorganic Ca Mg Carbonates in the Lacustrine Environment,
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Hydrogeologic Criteria for the Self-Purification of Polluted Groundwater,
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Studies on the Coastal Oceanography in the Vicinity of Fukuyama, Hiroshima Pref., I. Distribution Patterns of Temperature, Chlorinity, pH and Inorganic Nutrient (Phosphate-P, Ammonia-N, Nitrite-N, Nitrate-N) Contents of Sea Water in Early February, 1968, (In Japanese),
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INSTITUT GIGIENY TRUDA I PROFESSIONALNYKH ZABOLEVANII, MOSCOW (USSR).
Hygienic Substantiation of Permissible Humidity Level in Case of High Temperature, (In Russian),
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INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE, VERSAILLES (FRANCE).
Textural Aspect of Soil Porosity, (in French),
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INSTITUT PASTEUR, LILLE (FRANCE). LABORATOIRE D'HYDROBIOLOGIE.
Automation of the Bacteriological Analysis of Water, I, Study of a New Specific Test for Fecal Contamination and the Optimal Conditions for its Determination,
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INSTITUT PO FURAZHITE, PLEVEN (BULGARIA).
Influence of the Nutrient Solution Concentration Upon the Water Absorption of Pea Plants, (In Bulgarian),
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INSTITUT TECHNIQUE DES CEREALES ET FOURRAGES, PARIS (FRANCE).
Optimisation of Sampling for Determining Water Balances in Land under Crops by Means of Neutron Moisture Meters (Optimisation de l'Echantillonnage pour Determiner les Bilans

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INSTITUTE OF BIOLOGY OF THE SOUTHERN SEAS, SEVASTOPOL (USSR).
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INSTITUTE OF GEOLOGICAL SCIENCES, LONDON (ENGLAND).
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INSTITUTE OF GEOLOGICAL SCIENCES, LONDON (ENGLAND). DEPT. OF HYDROGEOLOGY.
Interstitial Water Chemistry and Aquifer Properties in the Upper and Middle Chalk of Berkshire, England,
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INSTITUTE OF HYDROLOGY, WALLINGFORD (ENGLAND).
A Review of Some Mathematical Models Used in Hydrology, with Observations on Their Calibration and Use,
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INSTITUTE OF MEDICINE (I), RANGOON (BRUMA). DEPT. OF MICROBIOLOGY.
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A Physicochemical Study of the Water of Small and Large Ponds and Its Effect on Pisciculture, (In Rumainia),
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INSTITUTUL AGRONOMIC, IASI (RUMANIA).
Contributions to the Study of the Biology of the Association Festucetum Valesiacae Burd. Et Al., 1956 in the Moldavian Forest Steppe, (In Rumanian),
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INSTITUTUL DE CERCETARI PENTRU CEREALE SI PLANTE TEHNICE, FUNDULEA (RUMANIA).
Sunflower Drought Resistance at Various Growth Stages, (In Rumanian),
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INSTITUUT VOOR TOEPASSING VAN ATOOMENERGIE IN DE LANDBOUW, WAGENINGEN (NETHERLANDS).
Water Uptake from Foliar-Applied Drops and its Further Distribution in the Oat Leaf,
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Influence of the Growing Nitrogen Doses on the Yields of Mixtures of Lucerne with Grasses as Well as on those of Lucerne and Grasses in Pure Cultures, (In Polish),
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Populations of Cladocera and Copepoda in Dam Reservoirs of Southern Poland,
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JOHNS HOPKINS UNIV., BALTIMORE, MD. DEPT. OF ENVIRONMENTAL MEDICINE.
Current Status of Knowledge of the Biological Effects of Heavy Metals in the Chesapeake Bay,
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JYVASKYLA UNIV. (FINLAND). DEPT. OF BIOLOGY.
Vertical Distribution and Abundance of the Macro- and Meiofauna in the Profundal Sediments of Lake Paijanne, Finland,
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KANSAS STATE DEPT. OF HEALTH, DODGE CITY.
Source Determination of Mineralization in Quaternary Aquifers of West-Central Kansas,
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KASPIISKII NAUCHNO-ISSLEDOVATELSKII INSTITUT RYBNOGO KHOZYAISTVA, ASTRAKHAN (USSR).
The Water Divider and Reproductive Conditions of Volga Sturgeon, (In Russian),
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KAZAKHSKII NAUCHNO-ISSLEDOVATELSKII GIDROMETEOROLOGICHESKII INSTITUT, ALMA-ATA (USSR).
Materials of the Anniversary Session of the Academic Council (Materialy Yubileynoy sessii Uchenogo soveta).
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KIEL UNIV. (WEST GERMANY). INSTITUT FUER MEERESKUNDE.
Petroleum Hydrocarbons in Oysters From Galveston Bay,
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KIEL UNIV. (WEST GERMANY). INSTITUT FUER PFLANZENBAU UND PFLANZENZUECHTUNG.
The Influence of Nitrogen Leaching During Winter on the Nitrogen Supply for Cereals, (In German),
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KON-KUK UNIV., SEOUL (SOUTH KOREA). DEPT. OF BIOLOGY.
An Analysis of Ecological Factors Limiting the Distribution of a Group of Stipa pulchra Associations,
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The Utilization and Consumption of Mercury in France: Outline of the Resulting Health Problems, (In French),
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LABORATOIRE NATIONAL D'HYDRAULIQUE, CHATOU (FRANCE).
Study of Various Possible Designs for Water Intake and Outlet Systems of Large Power Stations, Considering Hydrualic Plant Operating Problems and Site Suitability (Quelques Considerations sur le Choix du Systeme P rise-Rejet des Grands Amenagements Thermiques Selon Leur Localisation),
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LEIPZIG UNIV. (EAST GERMANY).
The Daily Course of Stomata Apertures in Oats (Avena Sativa L.) of Different Age of the Plants Respectively Leaves,
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LENINGRAD STATE UNIV. (USSR). DEPT. OF ENTOMOLOGY.
Disribution of Microarthropods in Spruce-Forests of the Chonkemin River (Tyan-Shan), (In Russian),
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LIVERPOOL UNIV. (ENGLAND). DEPT. OF OCEANOGRAPHY.
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Methods of Measuring Drift for Production Biology Studies in Running Waters, (in German),
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MAX-PLANCK-INSTITUT FUER LIMNOLOGIE, SCHLITZ (WEST GERMANY). LIMNOLOGISCHE FLUSSTATION.
Emergency Control, A New Method for Productivity Studies in Running Waters, (In German),
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MCGILL UNIV., MONTREAL (QUEBEC). DEPT. OF METEOROLOGY.
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MINISTRY OF AGRICULTURE AND WATER, RIYADH (SAUDI ARABIA).
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Process for Treating Waste Effluent,
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On the Geometrical Basis of Intrinsic Hydrogeologic Parameters in Porous Media Flow,
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Polychlorinated Biphenyls-Environmental Impact. A Review by the Panel on Hazardous Trace Substances. March 1972,
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MISSOURI CLEAN WATER COMMISSION, JEFFERSON CITY.
Storage Facilities (For Hazardous Substances) Regulation Presented at Hearing on March 21, 1973.
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(Emergency) Enforcement Regulation (To Protect State Waters) Presented at Hearing on March 21, 1973.
W73-10259 5G

MISSOURI WATER POLLUTION BOARD, JEFFERSON CITY.
Missouri Water Pollution Control Board Regulations for Turbid Water Discharges, (To Prevent Intermittent or Accidental Pollution of Waters of the State).
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MONTGOMERY (JAMES M.), INC., PASADENA, CALIF.
Local Scour Under Ocean Outfall Pipelines,
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MOSCOW STATE UNIV. (USSR).
Statistical Characteristics of Velocity and Temperature Fields in Ice-Covered Bodies of Water (Statisticheskiye Kharakteristiki Poley Skorosti i Temperatury v Vodoyemakh, Pokrytykh L'dom),
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The Use of Nuclear Techniques in Soil, Agrochemical and Reclamation Studies. (Primenenie Metodov Atomnoi Tekhniki V Pochvenno-Agrokhimicheskikh I Meliorativnikh Issledovaniyakh),
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MOSS LANDING MARINE LABS., CALIF.
A Short Survey of the Environment at the Dumping Site For Santa Cruz Harbor Dredging,
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Air Flow Land-Sea-Air-Interface: Monterey Bay, California - 1971,
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MOUND LAB., MIAMISBURG, OHIO.
Annual Environmental Monitoring Report: Calendar Year 1972,
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MOWID ANSTALT, VADUZ (LIECHTENSTEIN). (ASSIGNEE).
Well Pumping Apparatus for Polluted Water,
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MUNESTER UNIV. (WEST GERMANY).
Ecophysiological Studies on Heavy Metal Plants in Southern Central Africa,
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MUNICH UNIV. (WEST GERMANY). ZOOLOGISCH-PARASITOLOGISCHES INSTITUT.
Influence of Food Quality and Quantity on the Population Dynamics of the Planktonic Rotifer Brachionus Calyciflorus in Laboratory Experiments and in the Field, (In German),
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Ecological Factors that Induce Sexual Reproduction in Rotifers, (In German),
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Association Coefficients of Three Planktonic Rotifer Species in the Field and Their Explanation by Interspecific Relationships: (Competition, Predator-Prey Relationships), (In German),
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, HAMPTON, VA. LANGLEY RESEARCH CENTER. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, LANGLEY STATION, VA. LANGLEY RESEARCH CENTER.
A Review of Methods for Predicting Air Pollution Dispersion,
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NATIONAL CENTER FOR EARTHQUAKE RESEARCH, MENLO PARK, CALIF.
Earthquakes and Fluid Injection,
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Bioenvironmental Features: An Overview.
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NATIONAL MARINE FISHERIES SERVICE, SEATTLE, WASH. MARINE MAMMAL BIOLOGICAL LAB.
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NATIONAL OCEAN SURVEY, ROCKVILLE, MD.
Recent Subsidence Rates Along the Texas and Louisiana Coasts as Determined from Tide Measurements,
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO. ATMOSPHERIC PHYSICS AND CHEMISTRY LAB.
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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD. OFFICE OF ECOLOGY AND ENVIRONMENTAL CONSERVATION.
Involvement of NOAA in Coastal Pollution Management,
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Use of Infrared Aerial Photography in Identifying Areas with Excess Moisture and Groundwater Outflow (Ob Ispol'zovanii Infrakrasnoy Aeros 'Yemki Pri Vyyavlenii Uchastkov Izbytochnogo Uvlazhneniya I Vykhodov Podzemnykh Vod),
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Non-Equilibrium Phenomena in Chemical Transport by Ground-Water Flow Systems,
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A Study of the Cost Effectiveness of Remote Sensing Systems for Ocean Slick Detection and Classification,
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Computer Languages for Engineers,
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NEW MEXICO STATE UNIV., UNIVERSITY PARK. JEMEZ ATMOSPHERIC WATER RESOURCES RESEARCH PROJECT.
A Randomized Cloud Seeding Project in Northern New Mexico,
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NEW YORK OPERATIONS OFFICE (AEC), N.Y. HEALTH AND SAFETY LAB.
Fallout Program. Quarterly Summary Report (Dec. 1, 1972 Through March 1, 1973),
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Recommended Treatment of Oiled Seabirds.
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Second Annual Report of the Advisory Committee on Oil Pollution of the Sea. Research Unit on the Rehabilitation of Oiled Seabirds.
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Water and Wastewater Management in Dairy Processing,
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OFFICE DE LA RECHERCHE SCIENTIFIQUE ET TECHNIQUE OUTRE-MER, ABIDJAN (IVORY COAST). CENTRE D'ADIOPODOUME.
Evapotranspiration of Different Crops in A Mediterranean Semi-Arid Region, (In French),
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Gloeotrichia pisum Thuret in Lake Trasimeno, (In Italian),
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Chironomidae in Streams of the Polish High Tatra Mts.,
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General Characteristics of the Biocoenosis in the Polish High Tatras,
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POLISH ACADEMY OF SCIENCES, WARSAW. DEPT. OF APPLIED LIMNOLOGY.
Transpiration of Reed (Phragmites communis Trin.),
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POLISH ACADEMY OF SCIENCES, WARSAW. INST. OF ECOLOGY.
Dependence of Production of Bacteria on Their Abundance in Lake Water,
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Horizontal Soil-Water Intake Through a Thin Zone of Reduced Permeability,
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The Effect of Total Water Supply and of Frequency of Application Upon Lucerne: I. Dry Matter Production,
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Stream Channel Enlargement Due to Urbanization,
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Properties and Manifestations of Regional Groundwater Movement,
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Supposed Toxicities of Marine Sediments. Beneficial Effects of Dredging Turbidity,
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RICHARDS OF ROCKFORD, INC., ILL.
Large Scale Spray Cooling,
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ROBERT AND CO. ASSOCIATES, ATLANTA, GA.
Comprehensive Area-Wide Water and Sewer Plan.
W73-09814 6A

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCES, MIAMI, FLA.
Provenance and Accumulation Rates of Opaline Silica, Al, Ti, Fe, Cu, Mn, Ni, and Co in Pacific Pelagic Sediments,
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Preliminary Results on the Effect of Polyethylene Foil Applied as a Barrier Layer, (In German),
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ROSTOV-ON-DON STATE UNIV. (USSR).
Complex of Soil-Dwellers in Sugar-Beet Fields on Floodlands, (In Russian),
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ROTHAMSTED EXPERIMENTAL STATION, HARPENDEN (ENGLAND).
Growth and Water Use of Lolium perenne: I. Water Transport,
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RUHR-UNIVERSITAET BOCHUM (WEST GERMANY).
The Influence of Annual Flooding on Population Changes of Soil Arthropods in the Central Amazonian Rain Forest Region,
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RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. WATER RESOURCES RESEARCH INST.
Water Resources Development in the Mullica River Basin Part II: Conjunctive Use of Surface and Groundwaters of the Mullica River Basin,
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SCHIMPELER-CORRADINO ASSOCIATES, LOUISVILLE, KY.; AND SCHIMPELER-CORRADINA ASSOCIATES, LEXINGTON, KY.
Program Design for Planning Water Quality Management in Kentucky River Basins.
W73-09825 6B

SCOTTISH RESEARCH REACTOR CENTRE, GLASGOW (SCOTLAND). RADIOCARBON UNIT.
Further Investigations of the Transfer of Bomb 14C to Man,
W73-09908 5B

SCRIPPS INSTITUTION OF OCEANOGRAPHY, LA JOLLA, CALIF.
The Fluxes of Marine Chemistry,
W73-10225 2K

SENATE, WASHINGTON, D.C.
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SEOUL NATIONAL UNIV. (REPUBLIC OF KOREA). DEPT. OF BOTANY.
Studies on the Water Pollution and Productivity in Kyonggi Bay in Summer Season (3): Classification of the Phytoplankton (III), (In Korean),
W73-10159 5C

SERVICOS DE ELECTRICIDADE S.A., SAO PAULO (BRAZIL).
Effect of Load Characteristics on the Dynamic Stability of Power Systems,
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SHELL OIL CO., HOUSTON, TEX.
Geometry of Sandstone Reservoir Bodies,
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SIEMENS A.G., MUNICH (WEST GERMANY). (ASSIGNEE).
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Natural History of Thymallus arcticus Baicalensis Dybowski, 1876, Acclimatized in the Dobsina Reservoir (Czechoslovakia), (In Czech),
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SOFT WARE ORIENTAL CO. LTD., TOKYO (JAPAN).
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SOIL CONSERVATION SERVICE, DES MOINES, IOWA.
Simon Run Watershed Project, Pottawattamie County, Iowa (Final Environmental Statement).
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Geologic Process Investigations of a Beach-Inlet-Channel Complex, North Inlet, South Carolina,
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The Effect of Hydrologic Factors on the Pore Water Chemistry of Intertidal Marsh Sediments,
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SOUTH DAKOTA STATE DAKOTA STATE UNIV., BROOKINGS. DEPT. OF ECONOMICS.
Weather Modification: An Economic Alternative for Augmenting Water Supplies,
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Pollution Potential of Runoff From Production Livestock Feeding Operations in South Dakota,
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SOUTH DAKOTA WEATHER CONTROL COMMISSION, PIERRE.
Progress in the South Dakota Weather Modification Program,
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SOUTHAMPTON UNIV. (ENGLAND). DEPT. OF CIVIL ENGINEERING.
An Approach to Analysis of Arch Dams In Wide Valleys,
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SPANISH INST. OF OCEANOGRAPHY, MADRID.
Study of the Oceanographic Conditions in the Ria de Arosa, in Summer, (In Spanish),
W73-10363 2L

STANFORD UNIV., CALIF. DEPT. OF CIVIL ENGINEERING.
Surface Heat Transfer From A Hot Spring Fed Lake,
W73-09847 2H

STATE COLL. OF AGRONOMICAL SCIENCE, GEMBLOUX (BELGIUM).
Pollution and Degradation of Soils: A Survey of Problems,
W73-10384 5B

STATE OCEANOGRAPHIC INST., MOSCOW (USSR).
Present and Future Water and Salt Balances of Southern Seas in the USSR (Sovremennyy i perspektivnyy vodnyy i solevoy balans yuzhnykh morey SSSR).
W73-09807 2H

STATE UNIV., COLL., BUFFALO, N.Y. GREAT LAKES LAB.
Fish Protein Concentrate: A Review of Pertinent Literature with an Emphasis on Production from Freshwater Fish,
W73-10313 3E

STOCKHOLM UNIV. (SWEDEN). INSTITUTIONEN FOR ANALYTISK KEMI.
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SWEDISH BOARD FOR TECHNICAL DEVELOPMENT, STUDVIK (SWEDEN).
Low Grade Heat from Thermal Electricity Production, Quantity, Worth and Possible Utilization in Sweden,
W73-09865 5G

SWEDISH WATER AND AIR POLLUTION RESEARCH LAB., GOTEBORG (SWEDEN).
Effects of Chlorinated Aliphatic Hydrocarbons on Larval and Juvenile Balanus balanoides (L.),
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SYDNEY UNIV. (AUSTRALIA). SCHOOL OF BIOLOGICAL SCIENCES.
Intertidal Algal Species Diversity and the Effect of Pollution,
W73-10249 5C

TATA INST. OF FUNDAMENTAL RESEARCH, BOMBAY (INDIA).
Mercury in Sea-Food From The Coast Off Bombay,
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TENNESSEE VALLEY AUTHORITY, CHATTANOOGA.
Control of Eurasian Watermilfoil (Myriophyllum spicatum L.) in TVA Reservoirs (Final Environmental Impact Statement).
W73-10266 4A

TENNESSEE VALLEY AUTHORITY, MUSCLE SHOALS, ALA.
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A. Centers of Competence		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W73-10167, 10172 10174 – 10209	38
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W73-09772, 10337	2
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B. State Water Resources Research Institutes		
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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation, Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agency.
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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